

**United States Department of the Interior  
U.S. Fish and Wildlife Service  
2321 West Royal Palm Road, Suite 103  
Phoenix, Arizona 85021  
Telephone: (602) 242-0210 FAX: (602) 242-2513**

R2/ES-TE  
CL 09-0014  
02-21-89-F-078R1

April 7, 2003

Memorandum

To: Superintendent, Organ Pipe Cactus National Monument, Ajo, Arizona

From: Field Supervisor

Subject: Biological and Conference Opinion for the Organ Pipe Cactus National Monument General Management Plan

This document transmits the U.S. Fish and Wildlife Service's (FWS) revised biological opinion based on our review of the proposed General Management Plan (GMP) for the National Park Service's (NPS) Organ Pipe Cactus National Monument (NM), located in Pima County, Arizona, and its effects on the Sonoran pronghorn (*Antilocapra americana sonoriensis*, pronghorn), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*, bat), and cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*, pygmy-owl), in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq., ESA). This revised biological opinion is provided in response to a Memorandum Opinion and Order dated January 7, 2003, from Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia in the case of *Defenders of Wildlife, et al., v. Bruce Babbitt, et al.* (Civil Action No. 99-927 [ESH]).

This biological opinion is based on information provided during the previous consultation on this action, updated information on the proposed action provided by your agency, new information on the status of pronghorn, telephone conversations, field investigations, and other sources of information as detailed in the consultation history. The bat will remain covered by the original biological opinion. We are using this opportunity to readdress the effects of the proposed action on the pygmy-owl, including proposed critical habitat, and on the Sonoran pronghorn, as the status, and our knowledge, of these species have changed dramatically since previous opinions. A complete administrative record of this consultation is on file at the Phoenix, Arizona, Ecological Services Field Office (ESO).

**CONSULTATION HISTORY**

◆ June 26, 1997: We issued our biological opinion on the GMP. The biological opinion provides a history of the consultation that occurred between April 4, 1989, and the issuance of the biological opinion, and is hereby incorporated by reference. The opinion found that the effects of the action were not likely to jeopardize the continued existence of the Sonoran pronghorn, lesser long-nosed bat, or cactus ferruginous pygmy-owl. Additional information regarding the incidental take statement and other details for the pronghorn are found in the Environmental Baseline. In regard to the pygmy-owl, we anticipated take of 15 pygmy-owls in the form of harassment of individuals nesting or foraging in the area during the life of the project (15 years). The opinion contained four reasonable and prudent

measures to minimize take of the pygmy-owl: (1) conduct a feasibility study to evaluate the effects of human presence on pygmy-owls in the Alamo Canyon campground, (2) establish closure areas on a case-by-case basis where pygmy-owls are detected along trails or other visited sites, (3) develop and implement interpretive media to elicit increased awareness of the vulnerability of pygmy-owls on the Monument in the event that pygmy-owl localities become common knowledge to the public and are being harassed, (4) monitor the effects of human visitation to Alamo Canyon Wash on pygmy-owls for the life of the project.

◆ June 30, 1997: NPS requested via e-mail that we change language in the biological opinion. The requested changes were only editorial except this substantive change in content regarding jurisdiction of State Route 85 (SR 85): “Approximately 22 miles of State Route 85 lie within Organ Pipe Cactus NM. The State of Arizona and Pima County are responsible for maintaining the federally constructed road under an [sic] 1941 cooperative agreement. Since Organ Pipe Cactus NM was established before the road was constructed and the federal government never deeded a legal interest in the road to the State or County, the NPS believes that neither the State nor County has a right-of-way for State Route 85 through Organ Pipe Cactus NM. Therefore, the NPS believes it may impose reasonable resource protection and public safety regulations on the road’s use.” On July 1, 1997, we sent a memo to NPS acknowledging that we had made the requested changes to the biological opinion.

◆ September 29, 1997: NPS released the final version of the GMP including an Environmental Impact Statement (EIS). In a December 15, 1997, memorandum, the NPS informed us that it had begun implementation of the reasonable and prudent measure from the biological opinion, which required modification of the north boundary fence to allow pronghorn movements. The NPS anticipated completing the fence modifications by mid-March 1998.

◆ March 5, 1998: We received the Record of Decision for the GMP EIS.

◆ July 27, 2000: We received a letter from NPS requesting reinitiation of formal consultation. The request resulted from a change of the posted speed limit on SR 85 through Organ Pipe Cactus NM. In 1997, the Arizona Department of Transportation changed the posted speed limit of SR 85 within Organ Pipe Cactus NM from 55 to 65 miles per hour (mph). Although the GMP and accompanying biological assessment (BA) were based on the 55 mph speed limit, our files indicate that the change in speed limit occurred before the final biological opinion was delivered, so the change in speed limit had not been consulted on.

◆ February 12, 2001: As discussed in the introduction to this opinion, Civil Action No. 99-927 [ESH], *Defenders of Wildlife, et al. v. Bruce Babbitt, et al.* precipitated this remanded biological opinion and 4 others. In the February 12, 2001, order, Judge Ellen Huvelle ruled (in part), “...that the Fish and Wildlife Service has acted in a manner that is arbitrary and capricious and contrary to law by issuing biological opinions that fail to address the impact of each defendant’s activities on the pronghorn when added to the environmental baseline, 50 C.F.R. §§ 402.02, 402.12(g), and fail to include in the environmental baseline the impacts of all Federal activities in the area in which defendants are proposing or engaging in an action that may affect, directly or indirectly, the pronghorn, 50 C.F.R. §402.02.” The court further ordered that “this matter is remanded to Fish and Wildlife Service, which has 120 days from the date of the Order to reconsider, in consultation with defendants, those portions of the Biological Opinions that have been found to be contrary to the dictates of the Endangered Species Act.”

The Judge’s order also required preparation of a supplemental EIS for the GMP, as well as for the Marine Corps Air Station (MCAS)-Yuma’s Yuma Training Range Complex (YTRC). In regard to the Sonoran pronghorn recovery plan, the Judge required us to develop objective, measurable recovery criteria and schedules for implementing recovery actions.

- ◆ March 15, 2001: We received a letter from NPS requesting that several actions be included in the remanded opinion. The NPS stated that given the due dates mandated by the Court for the remanded opinion, NPS staff would not be able to prepare BAs for the new projects, but that the necessary information could be provided. The NPS also stated that if we deemed that any of the projects should be omitted from the remanded opinion and consulted on separately, they would agree to handle them in that manner.
- ◆ April 12, 2001: The deadline for completion of the remanded opinions was extended by the Court to November 16, 2001.
- ◆ June 2001: A draft supplemental EIS for the YTRC was issued. This document clarified those actions that may affect Sonoran pronghorn and described how those effects would manifest.
- ◆ July 16, 2001: A draft supplemental EIS of the re-analysis of cumulative impacts on the Sonoran pronghorn was produced by NPS and distributed for public comment.
- ◆ July 24, 2001: We met with personnel from NPS to discuss the biological opinion. In our analysis, we had identified significant adverse effects to pronghorn and its habitat. We proposed several revisions to the proposed action to minimize or eliminate these effects. At that meeting, NPS personnel committed to exploring the addition of these measures to its GMP to conserve pronghorn.
- ◆ August 2, 2001: We met again with NPS and other agencies involved in management of the Sonoran pronghorn at a meeting of the Barry M. Goldwater Executive Council (BEC). We met to discuss the remanded biological opinions and measures that we had proposed to avoid or minimize adverse effects of proposed actions.
- ◆ August 22, 2001: We received a letter from Organ Pipe Cactus NM in response to the conservation measures we had proposed at the July 24, 2001, meeting. Organ Pipe Cactus NM outlined several measures incorporated for pronghorn conservation which were not included as part of the GMP.
- ◆ October 3, 2001: A conference call occurred between FWS and the NPS during which additional measures to conserve pronghorn were incorporated into the NPS GMP.
- ◆ October 10, 2001: Measures discussed during the October 3 conference call were formalized in an October 10, 2001, letter from Organ Pipe Cactus NM.
- ◆ October 22, 2001: We issued a draft biological opinion to NPS for their review.
- ◆ November 8, 2001: We received a final supplemental EIS of the re-analysis of cumulative impacts on the Sonoran pronghorn produced by NPS and distributed for public comment.
- ◆ November 13, 2001: We received a letter from Organ Pipe Cactus NM on November 13, 2001, informing us that they had no comments on the draft opinion.

- ◆ November 16, 2001: A final opinion was signed by our Regional Director.
- ◆ April 11, 2002: A record of decision for the re-analysis of NPS's cumulative impacts on the Sonoran pronghorn supplemental EIS was published in the Federal Register.
- ◆ January 7, 2003: Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia issued a Memorandum Opinion and Order in response to *Defenders of Wildlife, et al., v. Bruce Babbitt, et al.* (Civil Action No. 99-927 [ESH]). The Court found that we failed to adequately address the impact of NPS's proposed action (the GMP) on the pronghorn when added to the environmental baseline. The Court provided us 90 days to revise the NPS opinion. The Court ordered that FWS, in consultation with NPS, must reconsider those portions of the opinion that have been found to be contrary to the Court's order. This opinion is responsive to the Court's order.
- ◆ March 13, 2003: We sent NPS, via electronic mail, a recommended list of conservation measures to add to the proposed action of the GMP for conservation of the pygmy-owl.
- ◆ March 27, 2003: We issued a draft biological and conference opinion to NPS for their review.
- ◆ April 3-4, 2003: We received comments on the draft biological and conference opinion from NPS via telephone. NPS stated it would send a formal letter documenting these discussions and summarizing its implementation of the 2001 biological opinion.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

A GMP is a guide for future management of a park or other NPS unit for the next ten or fifteen years. The proposed action for the Organ Pipe Cactus NM (Figure 1) GMP has not changed since the previous remanded biological opinion issued November 16, 2001 (U.S. Fish and Wildlife Service 2001), and we refer back to that opinion, except for the following conservation measures specific to the pygmy-owl:

#### Conservation Measures for Pygmy-owl

Organ Pipe NM will:

1. Seek funding to implement a new program specifically to develop inventory and monitoring information on Organ Pipe Cactus NM about the pygmy-owl.
2. Mutually develop with the Border Patrol a comprehensive plan to manage human activity in backcountry areas associated with illegal traffic and associated law enforcement actions. The plan will include management actions specific to all listed species that occur on Organ Pipe Cactus NM, and will contain measures that specifically address minimization of noise and human activities near any pygmy-owl nests and known areas of pygmy-owl occurrence such as the Armenta Southeast, Boundary Site, Kuakatch, Growler, and Arch survey areas. The plan will be in place, and a copy provided to us by January 31, 2004.
3. Acquire and add to the Organ Pipe Cactus NM the section of state lands containing Growler Canyon (R7W, T14S, Section 36 Bates Well Quad).

## ***Scope of the Consultation***

This consultation is programmatic in that effects of the GMP on listed species are evaluated over a large range of actions to take place throughout the monument through the year 2012. However, this opinion is designed so that all aspects of the GMP are addressed herein to the program level. We offer this perspective for planning purposes only. In any case, NPS has the responsibility under section 7(a)(2) of the Act and 50 CFR 402.14(a) to review its actions to determine whether any action may affect a listed species or critical habitat, and if such a determination is made, to enter into consultation with us if that action has not been the subject of previous consultation. Reinitiation criteria are listed in the “CLOSING STATEMENT” of this document.

## **SONORAN PRONGHORN (*Antilocarpa americana sonoriensis*)**

### **STATUS OF THE SPECIES**

#### **A. Description, Legal Status, and Recovery Planning**

The Sonoran subspecies of pronghorn (*Antilocarpa americana sonoriensis*) was first described by Goldman (1945) from a type specimen taken near the Costa Rica Ranch, Sonora, Mexico by Vernon Bailey and Frederic Winthrop on December 11, 1932, and is currently recognized as one of five subspecies of pronghorn (Nowak and Paradiso 1983). The Sonoran pronghorn is the smallest subspecies of *Antilocarpa americana*. The subspecies was listed throughout its range as endangered on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966. Three sub-populations of the Sonoran pronghorn are extant (1) a U.S. sub-population in southwestern Arizona, (2) a sub-population in the Pinacate Region of northwestern Sonora, and (3) a sub-population on the Gulf of California west and north of Caborca, Sonora. The three sub-populations are geographically isolated due to barriers such as roads and fences, and in the case of the two Sonora sub-populations, by distance. Critical habitat has not been designated for the pronghorn.

The 1982 Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service 1982) was revised in 1998 (U.S. Fish and Wildlife Service 1998a). The recovery criteria presented in the revised plan entailed the establishment of a population of 300 adult pronghorn in one self-sustaining population for a minimum of five years, as well as the establishment of at least one other self-sustaining population in the U.S. to reclassify the subspecies to threatened.

Actions identified as necessary to achieve these goals include the following: (1) enhance present sub-populations of pronghorn by providing supplemental forage and/or water; (2) determine habitat needs and protect present range; (3) investigate and address potential barriers to expansion of presently used range and investigate, evaluate, and prioritize present and potential future reintroduction sites within historical range; (4) establish and monitor a new, separate herd(s) to guard against catastrophes decimating the core population, and investigate captive breeding; (5) continue monitoring sub-populations and maintain a protocol for a repeatable and comparable survey technique; and (6) examine additional specimen evidence available to assist in verification of taxonomic status.

In February 2001, the D.C. Federal District Court ordered the Fish and Wildlife Service to reassess Sonoran pronghorn recovery criteria and to provide estimates of time required to perform recovery actions detailed in the 1998 plan. In response, a supplement and amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan was prepared (U.S. Fish and Wildlife Service 2001). We concluded that, given the nature of the current threats, unknown elements of pronghorn life history and habitat requirements, uncertainty of availability of suitable reintroduction sites and animals for transplants, internal and external resistance to pro-active management actions on wilderness and other areas of public lands, and continuing uncertainty regarding the long-term stability and status of sub-

populations in Mexico, the data do not yet exist to support establishing delisting criteria. Tasks necessary to accomplish reclassification to threatened status (as outlined in the 1998 plan) should provide the information necessary to determine if and when delisting will be possible and what the criteria should be.

## B. Life History

Sonoran pronghorn inhabit one of the hottest and driest portions of the Sonoran Desert. They forage on a large variety of perennial and annual plant species (Hughes and Smith 1990, Hervert *et al.* 1997b, U.S. Fish and Wildlife Service 1998a), and will move in response to spatial limitations in forage availability (Hervert *et al.* 1997a). Although it is theoretically possible for pronghorn to meet water requirements through forage consumption (Fox *et al.* 1997), after subtracting water required for excretion, respiration, and evaporation (approximately 50 percent), predicted water intake from forage was not adequate to meet minimum water requirements for 14 of 20 simulated diets (Fox *et al.* 2000). Sonoran pronghorn will drink surface water if it is available (U.S. Fish and Wildlife Service 1998a).

Pronghorn consume a wide variety of plants. Fecal analysis indicated Sonoran pronghorn consume 69 percent forbs, 22 percent shrubs, 7 percent cacti, and 0.4 percent grasses (U.S. Fish and Wildlife Service 1998a). However, Hughes and Smith (1990) reported cacti are the major dietary component (44 percent). Consumption of cacti, especially chain fruit cholla (*Cylindropuntia fulgida*, Pinkava 1999), provides a source of water during hot, dry conditions (Hervert *et al.* 1997b). Other important plant species in the diet of the pronghorn include pigweed (*Amaranthus palmeri*), ragweed (*Ambrosia* sp.), locoweed (*Astragalus* sp.), brome (*Bromus* sp.), and snakeweed (*Gutierrezia sarothrae*) (U.S. Fish and Wildlife Service 1998a).

Sonoran pronghorn rut during July-September, and does have been observed with newborn fawns from February through May. Parturition corresponds with annual spring forage abundance. Fawning areas have been documented in the Mohawk Dunes and the bajadas of the Sierra Pinta, Mohawk, Bates, Growler, and Puerto Blanco mountains. Does usually have twins, and fawns suckle for about 2 months. Does gather with fawns, and fawns sometimes form nursery groups (U.S. Fish and Wildlife Service 1998a). Hughes and Smith (1990) recorded an average group size of 2.5 animals; however, group size observed by Wright and deVos (1986) averaged 5.1, with the largest group containing 21 animals.

The results of telemetry studies in 1983-1991 indicated that Sonoran pronghorns nonrandomly use their habitats (deVos 1998). Pronghorn move from north to south or northwest to southeast, and upslope as summer progresses. Movements are most likely motivated by the need for thermal cover provided by leguminous trees and water available in succulent cacti such as chain fruit cholla (Hervert *et al.* 1997b), that are more abundant on bajadas and in the southern portion of the pronghorn's range. Home range size of Sonoran pronghorn ranged from 24.9 to 468 m<sup>2</sup> for males and from 15.7 to 441 m<sup>2</sup> for females (Wright and deVos 1986).

Causes of pronghorn mortality are often difficult to determine; however, some radio-collared Sonoran pronghorn have been killed by coyotes, mountain lions, and bobcats. Some of these mortalities may have been influenced by dry periods, which predisposed pronghorn to predation (U.S. Fish and Wildlife Service 1998a). Hervert *et al.* (2000) found that the number of fawns surviving until the first summer rains was significantly correlated to the amount of preceding winter rainfall, and negatively correlated to the number of days without rain between the last winter rain and the first summer rain. Three radio-collared pronghorn died in July and August of 2002 with no obvious cause of death. Given that 2002 was one of the driest years on record, the proximate cause of these mortalities was likely heat stress and/or malnutrition resulting from inadequate forage conditions due to drought [(J. Hervert, Arizona Game and Fish Department (AGFD), pers. comm. 2002)].

### C. Habitat

Turner and Brown (1982) described seven subdivisions of Sonoran Desert scrub, two of which encompass the habitat of Sonoran pronghorn in the U.S. and the Pinacate Region of Sonora (Felger 2000). These are the Lower Colorado River Valley and the Arizona Upland subdivisions. Creosote (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) are dominant perennials of the Lower Colorado River Valley subdivision. Plant species along major water courses include ironwood (*Olneya tesota*), blue palo verde (*Parkinsonia floridum*), and mesquite (*Prosopis velutina* and *P. glandulosa*). Species in the Arizona Upland include foothill palo verde (*Parkinsonia microphyllum*), catclaw acacia (*Acacia greggii*), chain fruit cholla, teddy bear cholla (*Cylindropuntia bigelovii*), buckhorn cholla (*C. acanthocarpa*), and staghorn cholla (*C. versicolor*).

The habitat of the pronghorn in the U.S. consists of broad alluvial valleys separated by block-faulted mountain and surface volcanics. In December 1984, 40 percent of the pronghorn observed during a telemetry flight were in the Growler Valley, from the Aguila Mountains to the International Border. AGFD (1985) reported that pronghorn use flat valleys and isolated hills to a greater degree than other topographic features.

Drainages and bajadas are used by pronghorn during spring and summer. Washes flow briefly after rains during the monsoon season and after sustained winter rains. The network created by these washes provides important thermal cover (shade) for pronghorn during the hot summer season. Bajadas are used as fawning areas in the spring. Pronghorn were observed using palo verde, ironwood, and mesquite for cover during weekly AGFD telemetry flights, which began in 1994 (Hervert *et al.* 1997b). Pronghorn were observed in playas in April and May of 1988 and 1989 when forbs were abundant, later vacating these areas when desiccation of annuals occurred (Hughes and Smith 1990). In years with sufficient winter and spring precipitation, some playas produce abundant annual plant growth.

Some of the sandy areas within pronghorn habitat such as Pinta Sands, the Mohawk Dunes west of the Mohawk Mountains, and the west side of the Aguila Mountains, provide a greater variety of seasonal vegetation when precipitation events occur. The openness of these areas appears to be attractive for pronghorn as the annuals, grasses, and shrubs provide good forage, particularly in the spring. These areas have long been considered significant pronghorn habitat in the U.S. Carr (1974) reported seeing pronghorn frequently in the Pinta Sands area. Due to the more arid nature of valley and dune habitats, annuals dry and cure, with decreased palatability for pronghorns as summer approaches. Also, these habitats lack sufficient woody vegetation to satisfy pronghorn requirements for nutrition and thermal protection. These factors limit the temporal suitability of these areas and most pronghorn move to bajadas and washes in the southeastern portion of the range by early summer.

### D. Distribution and Abundance

#### *United States*

Prior to the identification of the subspecies known as the Sonoran pronghorn (Goldman 1945), specimens of pronghorn taken within its range were identified as other subspecies (AGFD 1981). Historically, the Sonoran pronghorn ranged in the U.S. from approximately the Santa Cruz River in the east, to the Gila Bend and Kofa Mountains to the north, and to Imperial Valley, California, to the west (Nelson 1925, Monson 1968, Wright and deVos 1986, Paradiso and Nowak 1971) (Figure 3).

During an international boundary survey conducted from 1892 through 1894, pronghorn were found in every open valley along the international boundary from Nogales, Mexico to Yuma, Arizona (Carr 1971). In 1893, Meams (1907) reported seeing a herd of 12 pronghorn near border monument 143 in

the Baboquivari Valley and small numbers in the Santa Rosa Valley near monument 161 on what is now the Tohono O'odham Nation. Nelson (1925) stated that in 1923, local people reported that a few pronghorn were still ranging in the Santa Rosa Valley. Carr (1970) noted the "sighting of eight antelope near Pisinimo on the "Papago Indian Reservation" (Tohono O'odham Nation) which most likely drifted north from Mexico," and that "there have been numerous rumors of antelope in the Papago country"; however, no recent reliable observations are known. Carr (1970) also stated that there "is a considerable amount of good Sonoran antelope habitat on the Papago Indian Reservation and particularly in the Great Plains area. However, Indian hunting and grazing practices prohibit a lasting resident antelope population." In 1894, pronghorn were abundant near monuments 178 and 179, and westward to Tule Well (Mearns 1907). In February 1894, Mearns observed them in the Lechuguilla Desert, as well. In the Colorado Desert (presumably west of the Gila and Tinajas Altas mountains), Mearns (1907) reported that pronghorn were not abundant. He observed pronghorn tracks in California at Gardner's Laguna, 6 miles south of monument 216, and 37 miles west of the Colorado River; and then again at Laguna Station, 7 miles north of monument 224 and 65 miles west of the Colorado River.

While Mearns (1907) suggested that pronghorn may have been common in some areas in the late 1800s, evidence suggests that the sub-population declined dramatically in the early 20<sup>th</sup> century. Sub-population estimates for Arizona, which began in 1925, have never shown the pronghorn to be abundant (Table 5).

Repeatable, systematic surveys were not conducted in Arizona until 1992. Since 1992, Sonoran pronghorn in the United States have been surveyed biennially (Bright *et al.* 1999, 2001) using aerial line transects (Johnson *et al.* 1991). Sub-population estimates from these transects have been derived using three different estimators (Table 6); currently the sightability model (Samuel and Pollock 1981) is considered the most reliable estimator (Bright *et al.* 1999, 2001). Table 6 presents observation data from transects and compares estimates derived from the three population models from 1992 through 2002.

Bright *et al.* (2001) defined the present U.S. range of the Sonoran pronghorn as bordered by Interstate 8 to the north, the International Border to the south, the Copper and Cabeza Mountains to the west, and SR 85 to the east. This area encompasses 2,508 mi<sup>2</sup> (Bright *et al.* 2001). Based on pronghorn location records from 1994-2001 (Figure 4), locations of pronghorn from 1983-1995, and observations by Carr (1972) and Hall (1981), pronghorn are believed to occur most frequently in the following areas: Pinta Sands, Growler Valley, Mohawk Valley, San Cristobal Valley, and between the Growler and Little Ajo Mountains (Daniel's Arroyo area). Wright and deVos (1986) stated that observations in the Growler Valley were frequent and that the Mohawk Valley, San Cristobal Valley, and Barry M. Goldwater Range (BMGR) support herds of 10 to 20 animals during most of the year. Also mentioned was a regularly observed herd of 7 to 10 pronghorn in the Cameron tank area on BLM lands near Ajo.

Occasional sightings of pronghorn are recorded outside of the range defined by telemetry locations in Figure 4. For instance, a possible pronghorn sighting occurred east of Aztec and north of Interstate 8 in 1990 (U.S. Fish and Wildlife Service 1998a). Two adult pronghorn were observed in 1990 (U.S. Fish and Wildlife Service 1998a) in the northern San Cristobal Valley approximately 5 miles southeast of Mohawk Pass in the Mohawk Mountains. In 1987, a Border Patrol agent reported a pronghorn on the Tohono O'odham Nation; this sighting was not confirmed.

Although observations of pronghorn were common along and east of SR 85 many years ago, observations east of SR 85 in recent years have been very rare. The paucity of recent observations east of the highway indicates that this heavily-used road currently poses a barrier to eastward movement. On June 12, 1996, however, an adult doe pronghorn was observed running west off the



right-of-way at the approach of a vehicle on the north end of the Crater Range (R. Barry, Luke AFB, pers. comm. 1996). There also exists an unconfirmed report of four Sonoran pronghorn attempting to cross SR 85 in August 1993 approximately 1 mile north of the Organ Pipe Cactus NM visitor center. A juvenile crossed the highway (two lanes) to the east, but with the approach of a vehicle, ran back across the road to rejoin a group of three pronghorn (T. Ramon, Organ Pipe Cactus NM, pers. comm. 1993). In July 2002, a radio-collared pronghorn crossed SR 85 and continued on to the base of the Ajo Mountains where it later died in August 2002. In September 2002, a second radio-collared pronghorn crossed SR 85. This animal spent most of its time in the vicinity of Ajo Mountain Scenic Loop road, just off the southwestern end of the Diablo Mountains. After 8 days, she crossed back to the west side of Highway 85, and moved to a locally green area in the Growler Valley west of the monument (NPS 2002). These seemingly aberrant movement patterns were likely the result of nutritional stress brought on by the 2002 drought, discussed further below.

In recent years, the Tohono O'odham Nation has not been accessible to state and Federal biologists to survey for Sonoran pronghorn. A Border Patrol agent reported a pronghorn on the Nation lands in 1987 (U.S. Fish and Wildlife Service 1998a), and although unconfirmed, this is the last report of Sonoran pronghorn on the Nation. There are no recent records of pronghorn south of the Nation in Sonora. Carr (1970) reported that hunting and grazing on the Nation was not compatible with maintaining a viable population of pronghorn. Phelps (1981) reported that pronghorn had not been observed on the Nation for 10 years. These observations suggest that pronghorn are likely extirpated from the Nation and adjacent areas.

The sightability model population estimates from 1992 to 2000 showed a 45 percent decrease in sub-population size (Table 6). The estimates indicate a steady decline in sub-population size, with the exception of the 1994 survey. The 1994 estimate may be somewhat inflated due to inconsistencies in survey timing (U.S. Fish and Wildlife Service 1998a, Bright *et al.* 2001). The 1994 survey occurred in March (whereas those of other years occurred in December) and therefore the number may be slightly inflated because of the sightability of pronghorn at this time of year (J. Morgart, FWS, pers. comm. 2001). Different population models may result in divergent estimates. Therefore, the inclusion of estimates obtained prior to 1992 in the analysis of population trends is not reasonable.

Some researchers believe that the number of pronghorn observed on transects is more statistically valid for the evaluation of population trends than estimates generated by population models (Johnson *et al.* 1991, Hervert *et al.* 1997a). The number of pronghorn observed on transects decreased by 32 percent from 1992 to 2000 (Table 6). Contrary to the sightability model estimate, the number of pronghorn observed on transects showed a minor increase, while the total number of pronghorn sighted actually decreased in 1994 compared to the 1992 survey. Sightability model estimates declined from 282 in 1994 to 130 in 1996. High fawn mortality in 1995 and 1996 and the death of half (8 of 16) of the adult, radio-collared pronghorn during the 13 months preceding the December 1996 survey suggests that the decline was real. Five consecutive six-month seasons of below normal precipitation (summer 1994 through summer 1996) throughout most of the Sonoran pronghorn range, likely contributed, in part, to observed mortality (Bright *et al.* 2001, Hervert *et al.* 1997b).

Adult mortality has been high in recent years, with predator-related mortality being the most frequently identifiable proximate cause of death (one of the recovery actions identified by the recovery team is development of a narrowly-defined and rigidly controlled coyote removal plan). Thirty-five adult pronghorn have been radio collared by AGFD since 1994. Of these, 31 (88 percent) have since died. A total of 13 of these mortalities were attributed to predation, while the remaining died from unknown causes. Some of the 18 mortalities attributed to unknown causes were likely caused by predation (J. Hervert, pers. comm. 2002); however, unavoidable lag times between time of death and scene investigation caused evidence to be obscured. No evidence of predation of pronghorn was documented near water sources (Hervert *et al.* 2000). Capture myopathy (physiological condition of

an animal, caused by fear, stress, and/or overexertion that sometimes manifests itself during or up to 14 days after capture; left untreated the effects can range from temporary debilitation to death) may have played a role in up to five of the mortalities in 1994 (Hervert *et al.* 2000). In the majority of documented mortalities, bone marrow condition was assessed. Only one specimen was determined to be in poor to fair condition, while all others were determined to be in good condition.

Mortality of radio-collared adults in 2002 was exceptionally high. At the start of the year, a total of 7 radio-collared Sonoran pronghorn were at large in the U.S. sub-population. By December 2002, all but one of these had died. For most, drought stress was considered to be the proximate cause. For those animals that may have succumbed to predation, it was suspected that drought stress was again a factor, by making the animal more vulnerable to predation, due to an emaciated physical condition and being forced into predator habitats by drought (NPS 2002). Three of these 2002 mortalities were females of prime breeding age (5-7 years old) with no identifiable cause of death. Given their relatively young age, lack of any signs of disease or predation, and the timing of their deaths during one of the most severe drought years ever recorded, these animals probably died of heat stress and/or malnutrition resulting from inadequate forage conditions due to drought (J. Hervert, pers. comm. 2002). The deaths of these prime-age individuals is indicative of how severe conditions were in 2002. Three sightings last summer of pronghorn in various parts of their range verified their declining condition. In July 2002, adult pronghorn were observed on Organ Pipe Cactus NM, Cabeza Prieta NWR, and the North TAC of BMGR. In all three cases, observers described the pronghorn as emaciated, with ribs visible, and rough-coated (M. Coffeen, FWS, pers. com. 2002). In August 2000, two pronghorn were spotted on the BLM's Cameron allotment about 2-3 miles south of Ajo by a Border Patrol agent. The agent reported the animals appeared "skinny" but were not emaciated or staggering.

The 2002 drought was one of the driest on record. As an example, annual rainfall at the Organ Pipe Cactus NM visitor's center was only 2.54 inches in 2002 (T. Tibbitts, Organ Pipe Cactus NM, pers. comm. 2002); *average* annual rainfall for the visitors center is 9.2 inches (Brown 1994). The extreme drought conditions profoundly affected adult pronghorn, resulting in the highest adult mortality rate documented thus far. Since 1995, adult mortality has averaged 22 percent a year. Yearly mortality rates have fluctuated around this mean in direct relationship with precipitation. In 1997 and 1999, years with relatively good rainfall, there was only 12 and 10 percent adult mortality, respectively. In contrast, during 1996, a relatively severe drought year, a 38 percent adult mortality was documented. The 2002 population survey conducted in November and December revealed the U.S. sub-population had declined to the lowest level ever recorded. A total of 18 pronghorn were observed, in three groups (8, 9, and 1). Applying these data to the AGFD sightability model results in a population estimate of 21 animals (18-33, 95 percent confidence interval), or a 79% decline from 2000. Also, very few fawns survived in 2002 to replace these dying adults. Because of the poor condition and low survivorship of animals during the rut in late summer and early fall, surviving pronghorn may not have bred. As of April 2003, only one fawn had been detected; however, adult pronghorn appear to be in good condition and the winter rains have produced a good crop of ephemeral forage (J. Morgart, pers. comm. 2003).

Although drought was likely the proximate cause of the dramatic decline of the U.S. sub-population in 2002, anthropogenic factors may have contributed to or exacerbated the effects of the drought. Historically, pronghorn likely moved to wetted areas and foraged along the Rio Sonoyta, Sonora, and the Gila River, Arizona during drought. These areas are no longer accessible for the U.S. population due to fences, Interstate 8, Mexico Highway 2, and other barriers. The rate of decline in the U.S. sub-population from 2000-2002 (79 percent) was also much greater than that observed in either the sub-population southeast of Highway 8 (18 percent decline) or the El Pinacate sub-population (26 percent) during the same period (see discussion of Mexican sub-populations in the next section). At least for the El Pinacate sub-population, observations of forage availability in the El Pinacate area from 2000-2002 and proximity to the U.S. population suggest the El Pinacate sub-population experienced the same

severe drought that occurred on the Arizona side (T. Tibbitts, J. Morgart, pers. comm. 2003). Yet that sub-population fared much better than its U.S. counterpart. The high level of human activities and disturbance on the U.S. side, particularly in regard to undocumented alien traffic, smugglers, and law enforcement response, as compared to what occurs in the El Pinacate area, is a likely contributing factor in the difference in rate of decline observed north and south of the border. We do not have data on differences in demographics, predation rates, or other factors between Mexican and U.S. populations that may have also contributed to differences in rates of decline from 2000-2002. See the section entitled "Drought" in the Environmental Baseline and "Cumulative Effects" for further discussion.

In 1996, a workshop was held in which a population viability analysis (PVA) was conducted for the U.S. sub-population of Sonoran pronghorn (Defenders of Wildlife 1998). A PVA is a structured, systematic, and comprehensive examination of the interacting factors that place a population or species at risk (Gilpin and Soulé 1986). For the Sonoran pronghorn PVA, these factors included impacts of inbreeding, fecundity, fawn survival, adult survival, impacts of catastrophes, harvest, carrying capacity, and numbers and sex/age composition of the present population. Based on the best estimates of demographic parameters at the time, the likelihood of extinction of Sonoran pronghorn was calculated as one percent in the next 25 years, 9 percent in the next 50 years, and 23 percent in the next 100 years. More severe threats include population fluctuation, periodic decimation during drought (especially of fawns), small present population size, limited habitat preventing expansion to a more secure population size, and expected future inbreeding depression.

Furthermore, the PVA suggested that the current pronghorn population is extremely sensitive to fawn mortality, with the likelihood of extinction increasing markedly when fawn mortality exceeds 70 percent. Thus, a 30 percent fawn crop (30 fawns/100 does) each year is necessary to ensure the continuance of the U.S. sub-population. This level of reproductive success has only been achieved in two of the last nine years. Fawn survival is correlated with precipitation (Hervert *et al.* 1997b). With above average precipitation in 1998, 33 fawns per 100 does were produced (Bright *et al.* 2001). In 2001, precipitation levels in the pronghorn range were the highest seen in many years. Pronghorn numbers increased from 99 in December 2000 to approximately 140 individuals in December 2001 (based on an estimated increase of 50 individuals by recruitment, minus an estimated adult mortality rate of 11 percent). However, as discussed above, during the severe drought in 2002, all the gains from the previous year were lost. Although an estimated 50 fawns were recruited into the sub-population in 2001, it appears few of these young and still-maturing animals survived the severe drought conditions of 2002. However, a dead pronghorn thought to be a 2001 fawn was discovered during the latest population survey. The animal was obviously killed by a bobcat, but appeared to be in good condition, with lots of fat in the body cavity. The 2002 fawn crop was estimated to be 1-5 (J. Morgart, pers. comm. 2002), consistent with trends of low fawn crops in low precipitation years. As mentioned above, due to severe conditions during the rut, the fawn crop in 2003 could be very low both in terms of fawns per doe and total numbers of fawns.

The Sonoran pronghorn's previously poor status, coupled with dramatic declines in both recruitment and adult survival during 2002, have resulted in the serious imperilment of the U.S. sub-population. Actions taken by Federal and state agencies in the immediate future will determine whether the Sonoran pronghorn will continue to survive in the United States. We, in close cooperation with the AGFD, Department of Defense, and other partners are initiating a series of emergency projects, such as providing water and forage enhancement projects, as well as embarking on longer term recovery actions, including developing a captive propagation facility, to increase the likelihood that the U.S. sub-population will persist.

*Mexico*

Historically, Sonoran pronghorn ranged in Sonora from the Arizona border south to Hermosillo and Kino Bay, west to at least the Sierra del Rosario, and east to the area south of the Baboquivari Valley on the Tohono O'odham Nation (Nelson 1925, Carr 1974, Monson 1968). The distribution in Baja California Norte is less clear, but observations by Mearns (1907) indicate they occurred in the Colorado Desert west of the Colorado River, as well.

Sonoran pronghorn are currently extant in two sub-populations in Mexico, including: (1) west of Highway 8 near the Pinacate Lava flow; and (2) north and west of Caborca and southeast of Highway 8. In 2001, a park ranger at Pozo Nuevo, El Pinacate y Gran Desierto de Altar Biosphere Reserve (El Pinacate), reported that pronghorn have been seen in recent years west of Volcan Pinacate to the Pozo Nuevo area, and reportedly use a cement cattle trough north of Pozo Nuevo (J. Rorabaugh, pers. comm. 2001).

Sub-populations of Sonoran pronghorn in Mexico had not been exhaustively surveyed until all suitable habitat within the current known range of the Sonoran pronghorn in Mexico was surveyed in December 2000 (Bright *et al.* 2001). Although the 1993 estimate was approximate, survey results suggested a decline in the sub-populations of 16 percent from 1993 to 2000 (Table 7). The December 2000 estimate was 346 individuals. This estimate, together with the 2001 U.S. estimate, provides a total estimated size of the U.S. and Mexico Sonoran pronghorn sub-populations in 2000-2001 of approximately 445 individuals (J.L. Bright *et al.*, AGFD, unpubl. data). Although the Sonoran pronghorn sub-populations in Mexico declined approximately 16 percent from 1993 to 2000, the decrease was not experienced equally across pronghorn range. Sonoran pronghorn habitat in Mexico is bisected by Highway 8. The sub-population southeast of Highway 8 remained stable or even increased slightly between 1993 and 2000 (Table 8). Forage conditions in 2000 were notably better in this area than the rest of Sonoran pronghorn range in Mexico and the U.S. (J. L. Bright *et al.*, AGFD, unpubl. data). The sub-population west of Highway 8 ranges throughout suitable habitat on and surrounding Volcan Pinacate, and is adjacent to the U.S. sub-population. Mexico Highway 2 (and to a lesser extent the international boundary fence) acts as a barrier to movement between El Pinacate and U.S. sub-populations. The El Pinacate sub-population declined by approximately 73 percent between 1993 and 2000 (Table 8). Dry periods and associated poor forage conditions, likely exacerbated by extensive livestock grazing, may have figured prominently in the significant decline observed in the El Pinacate sub-population. Pronghorn moving across Highway 8 to the southeast may also be an explanation for the changes in these sub-populations' sizes. Between 1993 and 2001, Highway 8 was widened and improved, increasing traffic and probably increasing its effectiveness as a barrier to pronghorn movement.

The two Mexico sub-populations were resurveyed in December 2002. A grand total (both El Pinacate and southeast of Highway 8) of 214 pronghorn in 32 groups were seen for a tentative population estimate of 280. (Note this may underestimate the sub-population due to animals that apparently moved between survey blocks between counts.) This represented a decline from the total number seen (266 - decline of 20 percent) and estimated (346 - decline of 19 percent) in December 2000. A total of 19 pronghorn were observed in the El Pinacate area for an estimate of 25. This is down from 34 estimated in 2000 (decline of 26 percent). In regard to the sub-population southeast of Highway 8, 195 pronghorn were observed, which extrapolates to an estimate of 255. This is also down somewhat from the 2000 estimate when 249 were observed, with an estimate of 311 (decline of 18 percent). Based on the 2002 surveys, the total number of pronghorn in the U.S. and Mexico is estimated at 301, a decline of 32 percent from 2000 (Bright *et al.* unpubl. data).

## E. Threats

### *Barriers that Limit Distribution and Movement*

Sonoran pronghorn require vast areas of unencumbered open range to meet their annual needs for survival and reproduction. This includes the ability to freely travel long distances between localized, seasonally sporadic rainfall events in search of forage. Highways, fences, railroads, developed areas, and irrigation canals can block these essential movements. Highway 2 in Mexico runs parallel to the southern boundary of Cabeza Prieta NWR and divides the range of the pronghorn between the U.S. and El Pinacate sub-populations. This highway supports a considerable amount of fast-moving vehicular traffic, and is fenced along its length, so is likely a substantial barrier to Sonoran pronghorn. In 1999, Dr. Rodrigo Medellin of Instituto de Ecologia reported that Sonora, Mexico is planning to widen and improve Highway 2 to four lanes, which would further reduce the likelihood of pronghorn crossing the highway.

Both Cabeza Prieta NWR and Organ Pipe Cactus NM maintain boundary fences along the border. At the southern boundary of Cabeza Prieta NWR, a seven-strand livestock fence continues to be a substantial barrier to pronghorn. Modifying the fences along the U.S./Mexico border to allow pronghorn passage could aid in maintaining genetic diversity if sufficient pronghorn movement occurred. It may, however, also lead to increased pronghorn fatalities from motorized traffic on Highway 2. Mexico has been involved in discussions regarding the fences, as any modifications could potentially affect pronghorn sub-populations in both countries. Sonoran pronghorn habitat in Mexico is also bisected by Highway 8 between Sonoyta and Puerto Peñasco. This highway is bordered in part by a livestock fence and receives considerable tourist traffic. A less-traveled highway runs from Puerto Peñasco to Caborca.

Between Gila Bend and Lukeville, Arizona, SR 85 appears to be a significant barrier to pronghorn dispersal eastward from their current range. Traffic volume and average speeds have increased substantially over the last 30 years as international trade and tourism have increased. The Arizona Department of Transportation increased the posted speed limit on SR 85 from 55 to 65 miles per hour (mph) in 1997, and 85<sup>th</sup> percentile traffic speed has increased from 68-71 mph in the same period (NPS 2001). This highway corridor is unfenced in Organ Pipe Cactus NM, allowing potential free movement of pronghorn and other wildlife, but has livestock fencing on both sides for most of the remaining mileage on BLM, Department of Defense (DoD), and private lands between Interstate 8 and Organ Pipe Cactus NM. Interstate 8, the Wellton-Mohawk Canal, agriculture, a railroad, and associated fences and human disturbance near the Gila River act as barriers for northward movement of pronghorn. De-watering of much of the Sonoyta River and barriers to pronghorn accessing the Gila River, such as Interstate 8 and the Wellton-Mohawk Canal, have caused significant loss of habitat and loss of access to water (Wright and deVos 1986). Agricultural, urban, and commercial development at Sonoyta, Puerto Peñasco, and San Luis, Sonora; in the Mexicali Valley, Baja California Norte; and at Ajo, Yuma, and along the Gila River, Arizona, have removed habitat and created barriers to movement. BLM grazing allotment fences in the Ajo area may have been a barrier to movement, but were modified after 1997 to allow safe passage of pronghorn (BLM, *in litt.* 2000). Fences between BLM lands and Organ Pipe Cactus NM and Cabeza Prieta NWR are also designed to allow passage of pronghorn. Although fences can be designed to encourage safe passage, pronghorn are less likely to move across a fence line of any design than through an area without fences (J. Morgart, pers. comm. 2002). In an effort to conserve the pronghorn, BLM will install lay-down fences on the Ajo allotments, so that, when cattle are not present on the allotments, fences can be lowered and any potential barrier effects to pronghorn eliminated.

Historically, pronghorn occurred in the Lechuguilla Desert and in low numbers in the Colorado Desert to the west of the Gila and Tinajas Altas mountains (Mearns 1907). No apparent barrier to movement from their current range to the Lechuguilla Desert exists. Interstate 8, Mexico Highway 2, and the Gila and Tinajas Altas mountains form a substantial barrier to movement between the Lechuguilla Desert and the Yuma Desert; however, pronghorn could potentially use Tinajas Altas pass as a corridor through the mountains.

### *Human-caused Disturbance*

A variety of human activities occur throughout the range of the pronghorn that have the potential to disturb pronghorn or its habitat, including livestock grazing in the U.S. and Mexico; military activities; recreation; poaching and hunting; clearing of desert scrub and planting of buffelgrass in Sonora; dewatering and development along the Gila River and Rio Sonoyta; increasing undocumented immigration and drug trafficking along the international border and associated law enforcement response; and roads, fences, canals, and other artificial barriers.

Studies of captive pronghorn, other than the Sonoran subspecies, have shown that they are sensitive to disturbance such as human presence and vehicular noise. Human traffic, such as a person walking or running past pronghorn in an enclosed pen, a motorcycle driving past, a truck driving past, a truck blowing its horn while driving past, or a person entering a holding pen, caused an increased heart-rate response in American pronghorn in half-acre holding pens (Workman *et al.* 1992). The highest heart rates occurred in female pronghorn in response to a person entering a holding pen, or a truck driving past while sounding the horn. The lowest heart rates occurred when a motorcycle or truck was driven past their pen. Other investigators have shown that heart rate increases in response to auditory or visual disturbance in the absence of overt behavioral changes (Thompson *et al.* 1968, Cherkovich and Tatoyan 1973, Moen *et al.* 1978).

A pronghorn can canter effortlessly at 25 mph, gallop without straining at 44 mph, and run flat out at speeds of 55-62 mph (Byers 1997). During an aerial reconnaissance, one herd of Sonoran pronghorn was observed 12 miles away from the initial observation location 1.5 hours later (Wright and deVos 1986). Hughes and Smith (1990) found that pronghorn immediately ran 1,310-1,650 feet from a vehicle, and that military low-level flights (<500 feet AGL) over three pronghorn caused them to move about 330 feet from their original location. Krausman *et al.* (2001) examined effects of ground-based and aircraft military activities on Sonoran pronghorn at the North and South tactical ranges (TACs) at the BMGR and concluded that behavioral patterns were similar with and without presence of military stimuli. Military activities, both ground-based and aerial, were associated with some changes in behavior (e.g., from standing to trotting or running, or bedded to standing) but the authors concluded that these changes were not likely to be detrimental to the animals. Eighty-seven (4.1 percent) of the 2,128 events with ground-based stimuli resulted in pronghorn changing their behavior to trotting or running; a total of 866 (41 percent) resulted in some change in behavior. Krausman *et al.* (2001) documented 149 direct overflights and 263 other overflights (in which the aircraft passed  $\geq 328$  feet to the side of the animal). Pronghorn changed their behavior 39 and 35 percent of the time during direct and other overflights, respectively. Unfortunately, we can not discern from Krausman *et al.* (2001) how pronghorn responded to low-level helicopter flights. A study is being developed to quantify effects of helicopter flights by the Border Patrol on Sonoran pronghorn. No conclusions could be drawn about effects to fawns due to poor fawn productivity during the Krausman *et al.* study. During times of drought, disturbances that cause pronghorns to startle and run would energetically have a more significant effect. Such energetic expenditures, particularly during times of stress, may lead to lower reproductive output and/or survival of individual animals (Geist 1971). As mentioned above, the amplified effects of disturbance during times of drought may explain the difference in response of the U.S. and Pinacate sub-populations to the 2002 drought.

### *Habitat Disturbance*

Livestock grazing has the potential to significantly alter pronghorn habitat and behavior (Leftwich and Simpson 1978, Kindschy *et al.* 1982, Yoakum *et al.* 1996). This is especially true in the arid Sonoran Desert. Cattle and other domestic livestock were first brought to northwestern Sonora, Mexico, in 1694 (Wildeman and Brock 2000). Overgrazing well into the 19<sup>th</sup> century by Spaniards and their

descendants caused widespread habitat changes throughout much of the Sonoran Desert, particularly in more settled areas such as central Sonora, Mexico (Sheridan 2000).

American ranchers were running livestock by the early 1900s in much of the area that would later become Organ Pipe Cactus NM (Rutman 1997) and Cabeza Prieta NWR (Cabeza Prieta NWR files). Because there was no international boundary fence until 1947, livestock from both the U.S. and Mexico ranged freely across the border (Rutman 1997). Rutman (1997) estimates 1,000 head of burros and horses were present in 1942 on the southern half of Organ Pipe Cactus NM, and as many as 3,000 cattle were present on Organ Pipe Cactus NM at one time. Cattle were removed from Organ Pipe Cactus NM, Cabeza Prieta NWR, and the BMGR in 1979, 1983, and 1986, respectively (U.S. Fish and Wildlife Service 1998a, Rutman 1997). Grazing continues to be an important use of currently used pronghorn habitat on BLM lands south of Ajo, former pronghorn habitat on the Tohono O'odham Nation and the Altar Valley, and in current and former habitats in Sonora. Wright and deVos (1986) stated that poor habitat conditions (caused in part by livestock grazing) still appeared to be the leading cause in the decline in Sonoran pronghorn numbers. In Sonora, livestock grazing occurs in ejidos (community ranches or farms) and other ranch lands throughout much of the range of the pronghorn. Cattle range farther in years with abundant annual growth and are more limited to areas near water during hot and dry periods and seasons.

Mining occurred historically throughout much of the U.S. range of the pronghorn. Miners probably hunted pronghorn and disturbed habitat locally. Mining is currently not a significant threat to Sonoran pronghorn in the U.S. No mining occurs now on the BMGR, Cabeza Prieta NWR, or Organ Pipe Cactus NM. The open pit and associated tailings piles at the Phelps Dodge copper mine at Ajo eliminated habitat in that area (MCAS-Yuma 2001, NPS 2001), but the mine is no longer in operation. During pronghorn surveys in Mexico in 2002, increasing effects from mining activities were noted in habitats used by the sub-population located southeast of Highway 8.

Illegal crossings by undocumented immigrants and drug smugglers in the U.S. range of the pronghorn has increased dramatically in recent years. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000 (U.S. Immigration and Naturalization Service 2001). In 2001, estimates of undocumented migrants traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001) and an estimated 150,000 people entered the monument illegally from Mexico (Milstead and Barns 2002). Illegal border-related activities and Border Patrol response have resulted in widespread habitat degradation and increased human presence in remote areas. Increased presence of Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and the BMGR (Klein 2000).

### *Small Population Size and Aging Demographics*

A possible minimum viable population for pronghorn is 50 animals (Reed *et al.* 1986, Scott 1990). At populations of less than 100, population viability declines at an increasingly steep rate. To maintain genetic diversity, a population of at least 500 is desirable (Defenders of Wildlife 1998). The U.S. sub-population is now estimated at 21 after the 2002 drought. At an estimated 25 in 2002 the El Pinacate sub-population is also well below the possible minimum viable population. Thus, 2 of the 3 pronghorn sub-populations are seriously endangered. At 280 animals, the third sub-population (southeast of Highway 8) may be too small to maintain genetic diversity. Loss of the U.S. sub-population would dramatically reduce our ability to manage or recover this subspecies. Populations at low levels may experience random variations in sex ratios, age distributions, and birth and death rates among individuals, which can cause fluctuations in population size and possibly extinction (Richter-Dyn and Goel 1972). The sex ratio as of December 2002 was skewed in favor of females (male:female ratio of

6:15, J. Morgart, pers. comm. 2003]), which may be advantageous in regard to reproductive potential. However, the small number of males may mean that some females may not encounter and breed with a male. In the future, a scenario in which males outnumber females by a similar margin is just as likely. In very sparse populations, males may have trouble finding females, reducing productivity (Ehrlich and Roughgarden 1987). Small populations are also sensitive to variations in natural processes, such as drought and predation (Hecht and Nickerson 1999).

In 2000, we were concerned that, because of limited recruitment over the last seven years, an estimated 56 percent of the sub-population was more than six years of age. Pronghorn rarely live more than nine years (Bright *et al.* 2001). However, the pronghorn that survived severe conditions in 2002 are likely younger animals (J. Hervet, pers. comm. 2003).

### *Disease*

Sonoran pronghorn can potentially be infected by at least one bacterial (leptospirosis) and two viral (bluetongue and epizootic hemorrhagic disease) diseases. Bluetongue virus and epizootic hemorrhagic disease virus together produce a hemorrhagic disease syndrome. Pronghorn are susceptible to an additional two bacterial (*Arcanobacterium* and *Fusobacterium*) and four viral (parainfluenza, St. Louis encephalitis, vesicular stomatitis, and malignant catarrhal fever) diseases; blood testing has shown pronghorn exposure to these diseases by increases in antibody titers over time. A number of other viral diseases, in particular, are known to affect North American ungulates and antelope and gazelle worldwide, including but not limited to, infectious bovine rhinotracheitis, bovine viral diarrhea and bovine syncytial virus (Williams and Barker 2001). The specific names, etiologies, signs, symptoms, reservoirs/hosts/transmission modes, controls, and applicable literature for those diseases specific to pronghorn are noted in Table 9.

Animals in general are subject to increased disease susceptibility when either very young, very old and debilitated, and/or stressed. The manner in which a particular disease is spread can also be a factor in disease risk. Noting Table 9, the diseases relevant to pronghorn can be transmitted indirectly through vectors, such as infected midges or ticks, or directly via aerosolized or direct contact of infected fluids or tissues. All the diseases in Table 9 are serious diseases of cattle, as well, and often lead to mortality. Cattle within the current range of the pronghorn have not been tested for the diseases listed in Table 9.

The most serious of the diseases listed in Table 9 are the two viruses, bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV) which together produce hemorrhagic disease (HD) syndrome. HD, in particular, can be spread by infected cattle via fecal contamination. Bovine feces are moist and voluminous, and at watering sources where animals congregate in large numbers, this fecal material is trampled into the soil, causing a substrate and odor that attract insects that are vectors capable of spreading the HD viruses from one animal to another nearby. Pronghorn, deer, and other wild ungulates produce drier, less voluminous, pelleted feces, which are less likely to produce moisture or odors that attract vectors, such as flies or midges.

Overcrowding at essential congregating areas, such as watering sources, particularly in times of drought is another factor that sets up an optimal situation for such disease transmission. Animals are competing for scarce resources and, particularly in times of severe drought, are stressed and debilitated.

Control of diseases in general can be managed in many cases by following often-used animal husbandry practices, including: (1) keeping hosts prone to infection (such as pronghorn and cattle) separated; (2) keeping vectors under control by ensuring that moist fecal material build-up at crucial areas (such as watering sources), does not occur; and, (3) keeping overcrowding, overconcentration, stressful competition and direct contact among animals to a minimum.



## **ENVIRONMENTAL BASELINE**

The environmental baseline includes past and present impacts of all Federal, state, or private actions in the action area; the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform from which to assess the effects of the action now under consultation.

### **A. Action Area**

The “action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Within the U.S. portion of the Sonoran pronghorn’s range, pronghorn interact to form one sub-population in which interbreeding may occur. The U.S. sub-population is effectively separated from sub-populations in the El Pinacate Region and on the Gulf Coast of Sonora by Mexico Highways 2 and 8, and the U.S.-Mexico boundary fence. Activities that may affect animals in any portion of the U.S. range of the pronghorn may affect the size or structure of the U.S. sub-population, or habitat use within the U.S. range. The action area for this biological opinion is defined as the range of the pronghorn within the U.S. (Figure 4), plus areas of Organ Pipe Cactus NM east of Highway 85 not currently used by pronghorn. Although this entire area is affected, at least indirectly, by the proposed action, effects of the proposed action are most evident where NPS activities will occur within the Monument.

Management of the action area is almost entirely by Federal agencies. The largest area, the BMGR (roughly 1.6 million acres) is managed by Luke AFB and MCAS-Yuma primarily for military training. Legislation removed the BLM from natural resources management on the BMGR in November 2001; these resources are now managed by MCAS-Yuma (western portion) and Luke AFB (eastern portion) in accordance with the Sikes Act. Organ Pipe Cactus NM manages 329,000 acres in the southeastern corner of the action area for scenic, ecological, natural, and cultural values. Cabeza Prieta NWR lies along the border west of Organ Pipe Cactus NM and encompasses 860,000 acres. Cabeza Prieta NWR is managed to protect, maintain, and restore the diversity of the Sonoran Desert. The BLM manages lands near Ajo for recreation, grazing (four livestock grazing allotments totaling 191,740 acres, and one allotment totaling 21,876 acres), and other multiple uses in accordance with the Lower Gila Resource Management Plan.

### **B. Terrain, Vegetation Communities, and Climate in the Action Area**

The action area is characterized by broad alluvial valleys separated by block-faulted mountains and surface volcanics. The Yuma Desert on the western edge of the BMGR is part of a broad valley that includes the Colorado River. It is bordered on the east by the Gila and Tinajas Altas mountains. To the east of these mountains are a series of basins and ranges; from west to east these include the Lechuguilla Desert; the Cabeza Prieta and Copper Mountains; the Tule Desert and Mohawk Valley, including the Mohawk Dunes and Pinta Sand Dunes; the Sierra Pinta, Mohawk, and Bryan mountains; the San Cristobal Valley; the Aguila and Granite mountains; the Growler Valley; the Crater Range, Growler, Bates, and Agua Dulce mountains; and the La Abra Plain and Puerto Blanco Mountains west of SR 85, eastward to the base of the Ajo Mountains. Elevations range from 180 feet in the southwestern corner of the BMGR to 3,294 feet in the Growler Mountains. Major drainages and mountain ranges run northwest to southeast. The mountains are of two major types: a sierra type, composed of metamorphic and granitic rock, and a mesa type, typically of basaltic composition. Major drainages flow mostly northward to the Gila River, although southern portions of Organ Pipe Cactus NM and the southern slope of the Agua Dulce Mountains drain south to the Rio Sonoyta, Sonora.

Climate is characterized by extreme aridity, mild winters, and hot summers. Approximately 2.7 inches of precipitation fall annually at Yuma, with slightly more than half of this occurring in the winter months (Brown 1994). Annual precipitation increases from west to east across the BMGR; at Aguajita/Quitobaquito, precipitation is 10.5 inches annually. Infrequent chubascos (tropical storms) bring heavy rains in September or October that can produce spectacular growth on warm-season perennial plants (Felger 2000).

The vegetation community of the western portion of the BMGR has been classified as the lower Colorado River Valley subdivision of Sonoran Desert scrub (Brown 1994). It is the largest and most arid subdivision of Sonoran Desert scrub. Vegetation in the valleys, particularly in the Yuma Desert, is dominated by the creosote-white bursage series of Sonoran Desert scrub (Brown 1994). This series occupies approximately three-fourths of the lowland or valley areas in the BMGR (Reichenbacher and Duncan 1989). In this series, creosote and white bursage are often co-dominants, with galleta grass (*Pleuraphis rigida*), dalea (*Psoralemmus emoryi*), coldenia (*Tequilia plicata*) and other locally abundant species. Distinctive floras are also found in dunes in the area, particularly in the Yuma Dunes west of the Tinajas Altas Mountains, at Pinta Sands, and at the Mohawk Dunes. Species such as dune buckwheat (*Eriogonum deserticola*), Mormon tea (*Ephedra trifurca*), bugseed (*Dicoria canescens*), dune spurge (*Euphorbia platysperma*), possibly the threatened Peirson's milkvetch (*Astragalus magdalenae peirsonii*), and wire lettuce (*Stephanomeria schottii*) are found in one or more of these dune habitats. These species are dune specialists typical of the Gran Desierto dunes in northwestern Sonora (Felger 2000).

In drainages, bajadas, and montane habitats (including the Mohawk, Cabeza Prieta, Granite, and the Sierra Pinta mountains), the mixed scrub series of the lower Colorado River subdivision (Brown 1994) is found. This community is more diverse than the creosote-bursage series and includes species more representative of the Arizona Upland subdivision of Sonoran Desert scrub, such as palo verde, saguaro (*Carnegie gigantea*), ironwood, and desert lavender (*Hyptis emoryi*), among others. Frost-sensitive species such as elephant tree (*Bursera microphylla*), limber bush (*Jatropha cuneata*), and Mexican jumping bean (*Sebastiania biloculare*) are also found in this community, but are more representative of species and genera of the Central Gulf Coast subdivision of Sonoran Desert scrub found to the south in Sonora (Dames and Moore 1995, Brown 1994).

The Arizona Upland subdivision of Sonoran Desert scrub is found in the Growler, Puerto Blanco, Ajo and Bates mountains, and surrounding bajadas. Vegetation in this community takes on the appearance of a scrubland or low woodland of leguminous trees, shrubs, and cacti. The woodland component is most developed and species richness is greatest in drainages. In the action area, common trees of the Arizona Upland include palo verdes, ironwood, catclaw acacia, and velvet mesquite (*Prosopis velutina*). Dominant cacti include saguaro, chain fruit cholla, teddy bear cholla, and organ pipe cactus. Senita cactus (*Lophocereus schottii*), more common to the south in Mexico, is found in the southern portion of Organ Pipe Cactus NM and the Agua Dulce Mountains, Cabeza Prieta NWR. Vegetation on Cabeza Prieta NWR, Organ Pipe Cactus NM, and most of the BMGR is relatively undisturbed by human activities, although the increasing numbers of immigrants and smugglers, and law enforcement response, across these areas are resulting in elevated resource damage.

Rutman's (1996) assessment of accelerated erosion on the Monument implicates several historical and on-going sources of erosion related to livestock grazing. Rutman (1996) suggests the condition of the area near Rasmussen Tank has resulted in "large flows of water being delivered to Cuerda de Lena and Kuakatch Wash." In addition to the increase in runoff resulting from the condition of the Rasmussen Tank area, Rutman (1996) describes the effects of grazing on the Cuerda de Lena and Organ Pipe Cactus NM's concerns for continued grazing: "Grazing along Cuerda de Lena on BLM land has caused the development of vertical cutbanks just north of the monument. In 1995, these banks were chiselled by cattle hooves. Trees in the riparian zone were hedged by shade- and forage-seeking cattle

and understory vegetation was lacking or sparse. These conditions signal resource overuse, a situation that could significantly affect the Monument if the current permitted stocking rate and grazing system are maintained.”

The NPS has been managing buffelgrass on Organ Pipe Cactus NM since 1995. Part-time winter volunteers and occasionally seasonal employees survey for and manually remove buffelgrass. Monitoring plots and observations indicate the management program has been successful in reducing the effect of this species on native plants and plant communities. The number of acres surveyed and treated every year varies, depending on the availability of vehicles, funding and personnel. During the 2001-2002 winter season, 450 miles were walked, 4,200 acres were surveyed, and 30 tons of buffelgrass removed. Control efforts, which have focused on the borderlands, are in jeopardy due to lack of funding and increasing safety concerns. Without this effort, fire could become an increasing threat to native plant communities. Other adverse effects such as loss of species richness and diversity are expected and have been observed in other areas, but no studies exist. Native species are returning to areas on Organ Pipe Cactus NM that formerly had 100% cover of buffelgrass.

### **C. Status of the Sonoran Pronghorn in the Action Area**

#### *Distribution*

Figure 4 illustrates records of Sonoran pronghorn in Arizona from 1994-2001. Based on these locations and observed locations of pronghorn from 1983-1993, pronghorn have occurred most frequently in the following areas: Pinta Sands, Growler Valley, Mohawk Valley, San Cristobal Valley, and between the Growler and Little Ajo mountains (Daniel's Arroyo area). All localities from 1994-2001 are south of Interstate 8, east of the Copper and Cabeza Prieta mountains, and west of SR 85 (Bright *et al.* 2001). Habitat north of Interstate 8 has not been surveyed to any extent for pronghorn, but habitat in this area is highly fragmented. Interstate 8 and the Wellton-Mohawk Canal are probably barriers to movement of pronghorn.

On Cabeza Prieta NWR, pronghorn groups were most often observed on the southwestern edge of the Sierra Pinta Mountains and in the Pinta Sands, in the valley between the Sierra Pinta and Bryan mountains, in the San Cristobal and Growler valleys, and near Daniel's Arroyo. At Organ Pipe Cactus NM, pronghorn were most often observed near Acuna and Bates wells, and west of the Bates Mountains and Cipriano Hills. On the BMGR, concentrations of animals were observed near HE Hill on South TAC, with scattered sightings through the San Cristobal Valley and into the Mohawk Valley. John Hervert (AGFD, pers. comm. 1996) also believes that pronghorn frequent the northern portion of the Agua Duke Mountains. Pronghorn may have used the Pinta Sands area to a greater degree in the early 1970s (AGFD 1981).

Pronghorn often seek the thermal cover found in the Arizona Upland subdivision of Sonoran Desert scrub during the hot, dry summer months. This cover is best developed in the southeastern portion of their range in Arizona. With the onset of summer rains or cooler temperatures, pronghorn may move to the more open valleys and flats, such as the Growler Valley and Pinta Sands. Rocky, mountainous terrain, such as the slopes of the Growler or Mohawk mountains, is not considered habitat for the Sonoran pronghorn (deVos 1990); however, pronghorn may be found on lower slopes and in associated washes (L. Thompson-Olais, FWS, pers. comm. 1996).

While pronghorn can be present in Organ Pipe Cactus NM at all times of year, AGFD telemetry and survey data indicate that a greater proportion of the U.S. sub-population is present in the Monument from approximately February through August each year. This period corresponds with the fawning season and the summer dry season. Pronghorn move east into Organ Pipe Cactus NM in part to fawn, and also to move upslope onto more densely vegetated bajadas in search of forage, thermal cover, and

a slight respite from the greater heat of valley floors. When the monsoon rains arrive, pronghorn tend to move out of the Monument to the western parts of their range. Thus, pronghorn use Organ Pipe Cactus NM under conditions of greatest thermal stress. Pronghorn historically crossed SR 85 to use bajada habitats in eastern portions of Organ Pipe Cactus NM, and may still attempt to do so during the most extreme drought conditions as indicated by the presence of the two radio-collared pronghorn which moved into areas east of SR 85 during summer 2002.

### *Drought*

Rowlands (2000) examined trends in precipitation for southwestern Arizona and Organ Pipe Cactus NM from 1895-1999. For southwestern Arizona, no trend in precipitation was found for the period, but low precipitation occurred around 1895 and during the 1950s. Periods of high precipitation occurred in 1915-1920 and in the 1980s. For Organ Pipe Cactus NM, there was a slightly increasing trend in monthly and annual precipitation over the period 1895-1999, a strong drought occurred in the 1950s, and a lesser drought occurred in the 1970s (Felger 1980 notes a 34-month period, from September 1969-August 1972, without precipitation in the Sierra del Rosario). No discernable trend in precipitation in southwestern Arizona or Organ Pipe Cactus NM was found in the 1990s, which is when the current decline in the U.S. pronghorn population began. At four stations in southwestern Arizona, Hervert *et al.* (2000) note below normal precipitation in the winters of 1995/1996 (-2.78 inches) and 1996/1997 (-2.87 inches), and wet winters in 1994/1995 (+1.97 inches) and 1997/1998 (+4.29 inches). Annual plant production was exceptional in the winter of 1997/1998 and spring of 1998. The winter of 1992/1993 and spring of 1993 also saw a very good crop of annual plants. Because of increased precipitation, the eastern portions of the pronghorn's current range, including Organ Pipe Cactus NM, are most likely to support annual plant production, and thus are disproportionately important to the pronghorn.

Organ Pipe Cactus NM (2001) examined available data on precipitation and concluded that "although substantial year-to-year variations exist, the general trend in the later 20<sup>th</sup> century has been one of slightly increasing rainfall" at Organ Pipe Cactus NM. Since Rowland's analysis, we have had one year characterized by above-average rainfall and abundant ephemeral forage (2001) and a year with virtually no precipitation or ephemeral forage (2002). Consistent with the findings of Hervert *et al.* (2000) and Bright *et al.* (2001), the reproduction and survival were high in 2001 and very low in 2002. Historically, pronghorn populations must have weathered many severe droughts in the Sonoran Desert, including many that were more severe and longer term than what occurred in 2002. Given that pronghorn populations survived the droughts of the 1890s, 1950s, 1970s, and others before those it is unreasonable to solely attribute the current decline in the U.S. pronghorn population to drought. Organ Pipe Cactus NM (2001) concluded, "If (individual) recent dry years have had an impact on Sonoran pronghorn, it is most likely because in recent decades Sonoran pronghorn have much more limited options for coping with even brief moderate drought. Because of restrictions on their movements and range, and increasing human presence within their range, pronghorn are less able to employ their nomadic strategy in search of relief. It is not that drought itself is an impact, but possibly that drought has *become* an impact, due to other factors confounding the species' normal ecological strategy."

### **D. Past and Ongoing Non-Federal Actions in the Action Area**

The Status of the Species section describes a variety of human activities that have affected the Sonoran pronghorn since initiation of livestock grazing over 300 years ago (Officer 1993). Most non-Federal activities that have affected the pronghorn are historical in nature, and pronghorn have been all but extirpated from private, state, and Tribal lands.

Before the Taylor Grazing Act of 1934, and land use designations such as Organ Pipe Cactus NM, the BMGR, and Cabeza Prieta NWR, unregulated cattle grazing was widespread in the current range of

the pronghorn. Forage and precipitation is greater in the eastern portion of the current range, thus it is likely that grazing was more prevalent in BMGR-East, Cabeza Prieta NWR and Organ Pipe Cactus NM, than in BMGR-West (MCAS-Yuma 2001). However, cattle grazing presently occurs west of Volcan Pinacate and near the Sierra del Rosario in northwestern Sonora, which are as dry as much of BMGR-West; thus we suspect cattle grazing historically occurred throughout the current U.S. range. The degree to which cattle grazing may have affected soils and vegetation communities in this area is impossible to quantify. Humphrey (1987) compared vegetation in early photos taken at boundary monuments in the early 1890s with photos taken in the 1980s and could not discern any temporal differences in vegetation in what is now Organ Pipe Cactus NM, Cabeza Prieta NWR, and BMGR. However, the changes may have occurred before 1890. In reference to monument 172 at the southern end of the Quitobaquito Hills, Humphrey notes “the entire region near the spring has probably been grazed by domestic livestock since their introduction by the Spaniards in the early eighteenth century. Any grasses that might have grown there prior to that time had probably been grazed out long before the monument was erected.” Organ Pipe Cactus NM (2001) discusses possible effects of long-term grazing in pronghorn habitat, and apparent evidence and impacts of grazing still visible at Organ Pipe Cactus NM 25 years after cattle were removed.

Before the establishment of Organ Pipe Cactus NM, BMGR, and Cabeza Prieta NWR, mining occurred in many of the mountain ranges of the area. The copper mine at Ajo was operated by Phelps Dodge Corporation and others from 1911 to 1985. The open pit mine and its tailings eliminated pronghorn habitat east and southeast of Ajo. Smaller mining operations caused habitat disturbance locally, but most mines were in mountainous terrain outside of pronghorn habitat.

Hunting and poaching may have been an important factor historically in the decline of pronghorn populations early in the 20<sup>th</sup> century; however, the Sonoran pronghorn has been protected from hunting in the U.S. for more than 50 years, and we are not aware of any recent poaching events (U.S. Fish and Wildlife Service 1998a). Recreational hunting for other species occurs within the U.S. range of the pronghorn. Of particular importance is the bighorn sheep season, which occurs in December of each year, when a small number of hunters access remote portions of Cabeza Prieta NWR and BMGR to hunt a limited number of sheep. Presence of hunters in pronghorn habitat and discharge of firearms has the potential to disturb pronghorn; however, sheep hunting occurs at a time of year when temperatures are moderate, and hunters focus their activities in the mountains whereas pronghorn are in the valleys and bajadas.

Development of agriculture, including construction of canals, roads, towns, a railroad, and other activities along the Gila River excluded pronghorn from the riparian habitats, shade, forage, and water available along the river. Similarly, construction of Sonora Highway 2, the U.S./Mexico boundary fence, and towns and agriculture along the Rio Sonoyta, excluded pronghorn from these riparian habitats, as well. Flow in the Gila and Sonoyta rivers are now much reduced or restricted to return agricultural flows or periodic flood flows. These greenbelts may have been a source of water and forage, and probably acted as buffers, to enhance survival of pronghorn during drought periods (U.S. Fish and Wildlife Service 1998a).

Numbers of undocumented immigrants and smugglers have increased dramatically in the action area. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000 (U.S. Immigration and Naturalization Service 2001). In 2001, estimates of undocumented migrant traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001), and 150,000 for the year (Milstead and Barns 2002). These activities have resulted in route proliferation, off-highway vehicle (OHV) activity, increased human presence in backcountry areas, discarded trash, and abandoned vehicles. Habitat degradation and disturbance of pronghorn almost certainly results from these illegal activities. Increased illegal activities have precipitated increased law enforcement presence, particularly Border Patrol, with additional associated adverse

effects. However, without Border Patrol efforts the impacts from undocumented immigrants would be even greater.

## **E. Past and Ongoing Federal Actions in the Action Area**

Because of the extent of Federal lands in the action area, most activities that currently, or have recently, affected pronghorn or their habitat are Federal actions. The primary Federal agencies involved in activities in the action area include the MCAS-Yuma, Luke AFB, FWS, BLM, NPS, and Border Patrol.

Resource management on and near the BMGR is coordinated through the Barry M. Goldwater Executive Council (BEC), a group of Federal and state agency representatives with statutory authority and management responsibility for the BMGR, its resources, and adjacent Federal lands. Formalized in March 1998, the BEC provides a conduit for communication regarding resource management issues, conflicts, and planning on the BMGR. Membership on the council includes representatives from Luke AFB, MCAS-Yuma, the Phoenix and Yuma field offices of BLM, Cabeza Prieta NWR and Arizona ESO, Organ Pipe Cactus NM, AGFD, and Tucson and Yuma sectors of the Border Patrol. No single agency serves as the council lead and the organization operates on a consensus basis. One subcommittee of the BEC is dedicated to Sonoran pronghorn. The Military Lands Withdrawal Act of 1999 called for the establishment of a coordinating committee to act as an advisory group to land management agencies regarding management practices on the BMGR. This committee, the Intergovernmental Executive Committee (IEC), was convened in January 2002 and meets regularly.

AGFD, working in cooperation with a number of Federal agencies, has captured and radio-collared a total of 35 adult Sonoran pronghorn since 1994; 22 in 1994, nine in 1997/98, and four in 2000. Five pronghorn captured in 1994 died within 1-33 days post-capture. Three of these mortalities were from unknown causes, while two appeared predator-related (mountain lion and coyote). Since it is unusual to have this many animals die within 40 days post-capture, the direct or indirect effects of capture myopathy, was a suspected factor in their deaths. Capture and handling procedures were immediately modified and no subsequent losses related to capture myopathy have occurred. A sixth animal died from a broken neck caused by capture operations in December 2000. Despite these detrimental effects, data collected through radio telemetry are ultimately of great benefit to the conservation of the subspecies. Telemetry data provide information regarding habitat use and requirements, movement patterns, and increase the validity of population estimates.

In the following discussion, we have categorized Federal actions affecting the pronghorn as: (1) those actions that have not yet undergone section 7 consultation (although in some cases consultation has been completed on components of the Federal activity), and (2) Federal actions that have undergone consultation.

### *Federal Actions For Which Consultation Has Not Been Completed*

#### Management at Cabeza Prieta NWR

Over 90 percent of Cabeza Prieta NWR was designated by Congress as wilderness in the 1990 Arizona Wilderness Act. To help maintain wilderness character, no vehicular traffic is allowed except on designated public use roads. Vehicles may be parked up to 50 feet from the center of the roads in areas previously used by other vehicles. All other off-road travel is prohibited. Visitors are encouraged to practice a "leave no trace" ethic. Recreational activities on the Cabeza Prieta NWR include backpacking, hunting, camping, rock climbing, mountain biking, and driving on roads. Before entering, visitors must obtain a valid Refuge Entry Permit and sign a Military Hold Harmless Agreement.

Most of the Cabeza Prieta NWR is within the air space of the BMGR. Numerous low-flying aircraft cross the Cabeza Prieta NWR on their way to air-to-ground bombing and gunnery ranges located to the north. Low-level helicopter flights are limited to flight corridors and occur only in the spring and the fall; in FY 1995 this use represented 4.5 and 16.5 hours, respectively. Such flights may cause pronghorn to flee (Workman *et al.* 1992). Some military training exercises over the Cabeza Prieta NWR may require limitations on travel and even short periods of closure to the public.

Four-wheel drive vehicles are required on all routes except Charlie Bell Road where 2-wheel drive high-clearance vehicles may be driven. Driving in wet areas is prohibited and visitors are encouraged to not travel during wet conditions due to possible damage to refuge roads. In addition to the prohibitions mentioned above, the following activities are prohibited: dumping of litter, sewage, or liquid waste; firearms, except as authorized in writing by the Cabeza Prieta NWR manager; prospecting, removal, or disturbance of sand, rock, gravel, or minerals; rock hounding; excavating or removing objects of antiquity, cultural artifacts, or paleontological artifacts; trapping; collecting, possessing, molesting, disturbing, injuring, destroying, removal, or transportation of any plant, or animal, or part of the natural flora and fauna on the NWR (exceptions to the above are legally taken game); wood campfires; and unleashed pets.

The management plan for the Cabeza Prieta NWR includes an endangered species management component (U.S. Fish and Wildlife Service 1998b). Activities in this component include the use of remote sensors in coordination with the Border Patrol, an increase in monitoring, forage enhancement plots, a semi-captive breeding facility, and the possibility of the establishment of experimental waters for pronghorn. Specific objectives concerning management goals for the pronghorn were presented in a preliminary draft Comprehensive Conservation Plan (CCP) for the Cabeza Prieta NWR (U.S. Fish and Wildlife Service 1998b) and included coordination with AGFD to conduct aerial surveys, weekly telemetry flights, radio-collaring operations, digital vegetation mapping, food plot feasibility studies, installation of water developments with photomonitoring to document pronghorn use, telemetry tracking using remote data loggers, and coordination with Mexican authorities on pronghorn populations south of the border. Work continues on the CCP; the EIS is expected to be completed in 2003. When the CCP is completed, we will conduct section 7 consultation on that Plan if listed species or critical habitat may be affected. In the interim, we conduct section 7 interagency consultation on individual actions when they are proposed.

Cabeza Prieta NWR provides habitat for the pronghorn and is actively working to conserve the species. However, the presence of humans within pronghorn habitat may constitute a major disturbance factor. Furthermore, human presence may restrict pronghorn access to cover and/or forage and effectively create a barrier to movement.

#### Tucson Sector of the Border Patrol

The Tucson Sector Border Patrol section 7 consultation is not yet complete (consultation number 02-21-99-I-138). We have received three draft BA packages and expect to receive a fourth revised draft in the near future. This consultation encompasses all field activities conducted by the Border Patrol-Tucson Sector, as part of the program to detect, deter, and apprehend undocumented immigrants and drug traffickers. Also included will be the newly initiated patrol operation, Operation Grip, which is being conducted on the Los Vidrios Trail area of the Agua Dulce Mountains on Cabeza Prieta NWR. As part of this operation, trailers, which serve as living quarters for Border Patrol agents, have been placed near Bates Ranch on Organ Pipe Cactus NM.

The Tucson Sector is comprised of nine stations. Activities within the Ajo Station have the greatest potential to adversely affect pronghorn. Adverse effects may result from patrol road activities, drag road activities, off-road operations, aircraft overflights, and the use and maintenance of sensors.

Furthermore, the potential for disturbance to pronghorn due to human presence may increase in areas where agents live on site (i.e., Operation Grip). Border Patrol activities can be beneficial as well, in that they deter illegal border crossings, foot traffic, and off-road vehicles in pronghorn habitat associated with undocumented aliens and smuggling.

Patrol roads used by Border Patrol agents are typically public or private ranch roads. Although the Border Patrol is not the primary user of these roads, they do have the potential to encounter Sonoran pronghorn during patrols and cause them to flee the area. The Border Patrol monitors tracks of undocumented immigrants on drag roads (dirt roads that are regularly cleared by dragging tires behind a vehicle and then monitored for human tracks). Less than 10 miles of drag roads are used by the Ajo Station. Pronghorn appear to have an affinity for drag roads as the process of preparing the roads promotes forb growth (J. Hervert, pers. comm. 1999). Additionally, these roads may be utilized by pronghorn as bedding areas due to greater predator detection resulting from increased visibility (J. Hervert, pers. comm. 1999). Pronghorn attracted to these areas may be adversely affected by the presence of patrols and road preparation activities. Sensors are placed at strategic locations along the U.S.-Mexico border on established roads or trails within known travel corridors to detect illegal activities. The Ajo Station uses and maintains approximately 85-90 sensors during daily operations. Sensor installation and/or maintenance activities could disturb pronghorn if they are in the immediate area. However, these disturbances should be infrequent and short in duration.

Off-road activities include agents on foot, the use of OHVs, including four-wheel drive vehicles, dirt bikes, and all-terrain vehicles. These activities may disturb pronghorn and disrupt normal behavioral activities. Motorized off-road activities also degrade pronghorn habitat. In addition to off-road activities, one routine helicopter patrol route is flown from Why along a southwesterly route to the Agua Dulce Mountains. Additional helicopter activities may occur throughout the range of the pronghorn, and helicopters may hover and land. Areas where low-level helicopters are used have the highest potential for disturbance to pronghorn. Evidence from other subspecies of pronghorn and other ungulates suggests that pronghorn may exhibit elevated heart rates, may flee, and could alter habitat use in response to low-level helicopter flights (Workman *et al.* 1992).

#### Yuma Sector Border Patrol Beacon Stations

After initiating emergency consultation, the Yuma Sector Border Patrol installed six emergency beacon stations (panic buttons) on the BMGR as a means to reduce mortality of illegal immigrants. The installation of the stations resulted in little habitat disturbance; however, the presence of the electronic stations may increase human presence in these areas (undocumented immigrants, and maintenance and rescue crews) and therefore represents an additional disturbance factor for pronghorns. To date, the beacon stations have been activated several times. Yuma Sector Border Patrol is developing a package to reinstate consultation on their ongoing activities, including the operation and maintenance of these beacons. We are currently reviewing the preliminary draft BA for these activities.

#### U.S. Customs Activities

We are aware of U.S. Customs activities in pronghorn habitat, including vehicle and helicopter activities; however, Customs has not provided information to us about the extent or types of activities they conduct, and no consultation has occurred on these activities. Thus, we cannot evaluate how such activities may affect Sonoran pronghorn or their habitats.

#### *Federal Actions Addressed in Section 7 Consultations*

As part of our comprehensive discussion of all past and present actions affecting pronghorn within the action area, we describe below all biological opinions issued to date that may affect the pronghorn.



Four opinions addressed projects with minor effects to the pronghorn. Two opinions (consultation numbers 02-21-83-F-0026 and 02-21-88-F-006) covered capture and collaring of pronghorn for research purposes, with no incidental take of pronghorn anticipated. Consultation number 02-21-88-F-0081 involved installation of a water source in the Mohawk Valley for pronghorn, with no incidental take anticipated. Consultation number 02-21-89-F-008 addressed change in aircraft use by Luke AFB on the BMGR, including change in aircraft type from the F-15A/B to the F-15E, and an increase in nocturnal flights (F-15E Beddown Project). We anticipated take of pronghorn in the form of harassment as a result of aircraft overflights. Reasonable and prudent measures to minimize take included: (1) development of long-term studies to determine the effects of overflights on the pronghorn, (2) if effects of overflights are identified, Luke AFB would work with us to eliminate them, and (3) work involving pronghorn would be carried out in accordance with appropriate state and Federal permits. This project was later incorporated into the biological opinion on Luke AFB's activities on the BMGR, discussed below.

Nine biological opinions estimated effects of major projects with greater effects to pronghorn:

#### Border Patrol Activities in the Yuma Sector, Wellton Station, Yuma, Arizona

This biological opinion (consultation number 02-21-96-F-0334), issued September 5, 2000, addressed all Border Patrol activities along the United States/Mexico border in Yuma County from the Colorado River to about the area of Pinta Sands at the south end of the Sierra Pinta Mountains. Border Patrol activities within the Yuma Sector/Wellton Station included helicopter and ground patrols; drag road preparation and assessment of road maintenance; remote sensor installation and maintenance; apprehensions and rescues; and assistance to other sectors and agencies. To reduce adverse effects on pronghorn, the Border Patrol agreed to implement the following measures: (1) purchase new, quieter MD600N helicopters to replace existing OH-6As; (2) contact the AGFD weekly for an update on weekend telemetry flights to avoid areas of pronghorn concentration; (3) modify helicopter flights to avoid fawning areas during the three peak months of the fawning season (April-June); (4) make confidential monthly reports to the manager of Cabeza Prieta NWR detailing the law enforcement actions and wildlife observations made during the previous month; (5) finalize the Memorandum of Understanding between the Border Patrol and Cabeza Prieta NWR to address objectives that will minimize potential conflicts including limiting routine patrols and off-road use in wilderness and providing a framework for cooperation; and (6) conduct an annual interagency meeting with Cabeza Prieta NWR, the Arizona ESO, and BLM to present the annual report and discuss ways to improve coordination.

Disturbance to pronghorn was anticipated as a result of on-the-ground Border Patrol operations, and direct injury or mortality of pronghorn as a result of collision with Border Patrol vehicles or by low level helicopter flights abruptly approaching and startling pronghorn which may result in injury or energetic stress, particularly during drought. Pronghorn may also be adversely affected by noise and visual impacts of aircraft overflights. The increased energy expenditure caused by sudden or loud noises may lead to lower reproductive output and/or survival. The potential for detrimental effects to pronghorn may be greatest during the peak months of the fawning season (April-June). Habitat disturbance due to off-road vehicle travel would also result.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. We anticipated take in the form of harassment that is likely to injure up to one pronghorn in 10 years. The following reasonable and prudent measures were provided: (1) minimize injury of pronghorn; (2) monitor and study reactions of pronghorn on BMGR to Border Patrol activities; and (3) provide a means to determine the level of incidental take that results from Border Patrol activities. The following conservation recommendations were provided: (1) assign an environmental protection

specialist to coordinate the effects of their activities statewide on listed species in order to reduce these impacts where possible; (2) continue participation in ecosystem partnerships with other Federal agencies in pronghorn habitat; and (3) obliterate and block illegal roads in pronghorn habitat created by illegal border traffic.

The Border Patrol submitted an annual report of their activities in 2001, in which they stated that they were in the process of implementing the reasonable and prudent measures, terms and conditions, and conservation recommendations that were part of the proposed action. We are not aware of any incidental take attributable to Border Patrol activities in the Yuma Sector's Wellton Station resulting from the proposed action. Border Patrol is planning to reinstate consultation on its existing biological opinion, in order to reanalyze the effects of its ongoing actions and their cumulative effects on the Sonoran pronghorn.

#### BLM's Lower Gila South Management Area

Three biological opinions address BLM's Lower Gila South Management Area. The Lower Gila South Resource Management Plan-Goldwater Amendment (consultation number 2-21-90-F-042), proposed specific and general management guidance for non-military activities on the BMGR. Of particular importance for pronghorn was proposed management of recreation. Use of the BMGR is by permit only. The number of BMGR recreational use permits issued by the BLM field offices increased dramatically in the late 1990s, with a total of 893, 2545, and 3528 permits issued in 1998, 1999, and 2000, respectively. Permits are also issued by the USAF, Marine Corps, and Cabeza Prieta NWR. Permits are valid for any part of the BMGR that is open to public recreation. The presence of an increasing number of humans creates a disturbance risk to pronghorns, and OHVs may constitute a mortality factor. The OHV roads and heavily used vehicle-camping areas degrade habitat and may disturb pronghorn, as well as create barriers to pronghorn movement. No incidental take was anticipated. We provided conservation recommendations to reduce interaction between pronghorn and recreationists, exclude wild horses and burros from endangered species habitat, and investigate the effects of water sources on pronghorn. The non-jeopardy biological opinion, issued April 25, 1990, was programmatic, requiring BLM to consult when site-specific projects are proposed. To date, no site-specific formal consultations have been conducted. In November 2001, BLM's management of the range ceased and will be replaced by the BMGR Integrated Natural Resources Management Plan (INRMP). An internal draft INRMP has been completed, and the Plan is scheduled to be finalized, after undergoing section 7 consultation, by December 2003.

The Lower Gila South Habitat Management Plan (HMP) (consultation number 02-21-89-F-0213) provided management guidance for both specific and general actions in southwestern Arizona. Four actions were addressed in the HMP, including an exchange of 640 acres near Ajo, rehabilitation work on two catchments, and assessment of livestock removal from pronghorn habitat. Exchange of land out of public ownership may facilitate development or other uses that would preclude use by pronghorn. We provided the following conservation recommendations: a study to determine the effects of water developments on pronghorn and their competitors and predators, and development of a water catchment renovation plan in coordination with Cabeza Prieta NWR. No incidental take was anticipated. The non-jeopardy opinion was issued on May 15, 1990.

The biological opinion for the Lower Gila South Resource Management Plan and Amendment (consultation number 02-21-85-F-0069) addressed programmatic management of lands in southwestern Arizona, including livestock grazing, wilderness, cultural resources, fire, minerals and energy, recreation, wildlife management, wood cutting, Areas of Critical Environmental Concern, and other land uses. The biological opinion concluded that OHV restrictions and designations of Areas of Critical Environmental Concern would benefit pronghorn, but wood cutting, recreation, grazing activities, mining, and designation of utility corridors would adversely affect pronghorn. Incidental take of the pronghorn was anticipated, but not quantified. Any decline of forage quality or increase in the

amount of fencing was judged to indicate that incidental take had been exceeded. Reasonable and prudent measures and terms and conditions to minimize take included: (1) modifying grazing allotment fences to allow passage of pronghorn, (2) improving habitat conditions for the pronghorn, and (3) minimizing human disturbance. We provided conservation recommendations to monitor pronghorn use of the area,

assess pronghorn use at livestock waters, and consolidate lands through land exchanges. The non-jeopardy biological opinion was issued on March 27, 1998. In accordance with the opinion, BLM has monitored livestock grazing, and allotment fences have been modified to allow passage of pronghorn. Enforcement of vehicle and camping regulations has been increased south of Ajo.

In summary, the biological opinions for BLM's Lower Gila South Planning Area anticipated adverse effects to pronghorn and their habitat from livestock grazing, recreation, a land exchange, wood cutting, mining, and designation of utility corridors, resulting in an anticipated unspecified amount of take. We determined that the proposed actions were not likely to jeopardize the continued existence of the pronghorn.

#### Organ Pipe Cactus National Monument - Widen North Puerto Blanco Road

The biological opinion for the Widen North Puerto Blanco Road project (consultation number 02-21-01-F-0109) addressed impacts to pronghorn from the proposed construction of new recreational infrastructure (although consultation on this project is completed, construction has not yet begun due to concerns about the pronghorn). The project would widen the first 5.1 miles of North Puerto Blanco Road to allow for two-way travel, construct a vehicle turn-around, construct 4 interpretive pullouts with educational kiosks, and construct a parking area with picnic tables, a restroom facility, and educational kiosks at the terminus of the two-way segment. North Puerto Blanco Road would be widened from 14 feet to 20 feet, concrete low-water crossings would be installed in washes, and some steeper portions of the road would be paved for safety and erosion control.

The project is expected to result in effects to pronghorn from 11 acres of habitat loss, increased disturbance from recreational activities, and movement barrier effects from increased use of the road and recreational activities. Use of the new two-way road, pullouts, and terminus facility may curtail the movements of pronghorn into the area, effectively barring the species from a portion of their range. These effects are expected to be offset by Organ Pipe Cactus NM's program of annual closures and by delaying construction until the pronghorn's status has improved. Closing these facilities during the crucial fawning and summer dry seasons should largely eliminate these effects during periods when pronghorn are most likely to be in the monument and need access to these areas.

Organ Pipe Cactus NM proposed the following conservation measures to minimize effects to pronghorn: (1) institute a monitoring program such that any pronghorn detected in Organ Pipe Cactus NM will result in a 5-mile diameter buffer zone around the animal which will be closed to all activity, except for a minimal amount of administrative traffic; (2) limit backcountry permits to areas east of SR 85 and south of North Puerto Blanco Drive from March 15 to July 15; (3) close North Puerto Blanco Drive annually to public use from March 31 to July 15, and close the Bates Well Road and Pozo Nuevo Road to public use from March 15 to July 15; (4) continue to place temporary waters in backcountry areas during the dry season for pronghorn; (5) delay timing of construction of the project until after the fawning and summer dry seasons (March 15-July 15); and (6) delay construction until we have evaluated the status of the pronghorn and determined, in coordination with NPS and AGFD, that commencement of construction is prudent to begin.

We determined that the project was not likely to jeopardize the continued existence of the pronghorn. We provided conservation recommendations to continue to fund and support basic research, inventory, and monitoring of the Sonoran pronghorn in conjunction with the recovery team, explore additional

methods of ameliorating the barrier effects of SR 85, such as establishing a lower speed limit on SR 85, investigating the feasibility of installing underpasses on SR 85, and work with the recovery team to establish forage enhancement plots on Organ Pipe Cactus NM. The non-jeopardy biological opinion was issued October 29, 2002.

### *5 Remanded Biological Opinions*

In response to *Defenders of Wildlife, et. al., v. Bruce Babbitt, et. al.* (Civil Action No. 99-927 [ESH]), Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia issued a Memorandum Opinion and Order on February 12, 2001. The Court found that we failed to address the impact of various Federal actions on the Sonoran pronghorn when added to the environmental baseline and failed to include in the environmental baseline the impacts of all Federal activities in the area that may affect, directly or indirectly, the pronghorn.

The Court ordered us to produce, in consultation with the defendants, revisions of the following biological opinions: Air Force (USAF) (August 1997), Army National Guard (ARNG) (September 1997), BLM (December 1997), MCAS-Yuma (April 1996), and NPS (June 1997). The Court further ordered that we, in consultation with the Federal agencies whose biological opinions have been remanded, must reconsider those portions of the opinions that have been found to be contrary to the dictates of the Act. This included the scope of the action area, analysis of the environmental baseline, and analysis of the effects of incidental take in context with a revised environmental baseline. The remanded biological opinions were issued on November 16, 2001. A reinitiated opinion on the BLM's grazing allotments was completed in September 2002. In the following discussion, we describe both the original and remanded/reinitiated opinions for these five consultations.

#### BLM grazing allotments in the vicinity of Ajo, Arizona

The original biological opinion (consultation number 02-21-94-F-0192), issued December 3, 1997, addressed effects to pronghorn resulting from issuance of grazing permits on five allotments, four of which are located near Ajo and Why (Cameron, Childs, Coyote Flat, and Why allotments); and the fifth near Sentinel (Sentinel allotment). All but portions of allotments east of Highway 85 were considered to be within the current distribution of the Sonoran pronghorn. According to the BLM, livestock use of the five allotments had been relatively low in the previous ten years; however, the effects of stocking the allotments at any level had not been analyzed. Monitoring of the Coyote Flat and Why allotments had not occurred. The BLM permittees had not fully stocked the Cameron, Why, Sentinel, and Childs allotments for a sustained period of time. The Coyote Flat Allotment had been billed for full stocking. According to the BLM, monitoring data had not shown overutilization of the vegetation or a change in vegetation composition. The BLM estimated that if allotments were stocked at permitted levels, forage utilization rates could approach 40 percent. Preliminary data from the BLM and the AGFD showed that there is little dietary overlap between pronghorn and cattle. Because of this, the amount of forage on allotments, and the likely utilization levels, we found that adequate forage for the pronghorn should be available. Maintenance of livestock waters, fences, and other improvements may temporarily disrupt pronghorn activity. Pronghorn may also become entangled in livestock fences.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take of one pronghorn was anticipated to occur in the form of harassment or death due to grazing management activities during the 15-year proposed action. The following reasonable and prudent measures were provided to minimize take of pronghorn: (1) minimize impacts to pronghorn from grazing and (2) minimize habitat loss, degradation, and fragmentation of pronghorn habitat. The opinion included the following conservation recommendations: develop allotment

management plans for each allotment and monitor pronghorn use within Cameron, Coyote Flat, Sentinel, and Why allotments.

The BLM has provided two reports regarding the implementation of reasonable and prudent measures. The 1998-1999 report (dated April 13, 2000) stated that no maintenance work was authorized within the "area covered by this opinion". BLM established "utilization studies" on the Sentinel, Coyote Flat, and Why allotments in November 1998. The studies appear to consist of one transect for each of the allotments. The utilization transects for the Sentinel, Coyote Flat, Why, and Cameron allotments were read in 1998 and 1999. BLM reported low levels of utilization within the study areas. The 2000 report (dated November 28, 2000) stated that BLM modified 18 miles of fence within the allotments (three fencelines between Cameron, Why, and Coyote Flat and a small fence area within Coyote Flat) by replacing the bottom strand with smooth wire, raised 18 inches above ground level. The work was conducted June through August of 2000. Utilization transects for the four allotments were read in 2000. Again, BLM reported low levels of utilization. Both reports stated that there had been no incidental take of pronghorn as of the date of each report.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. A final biological opinion was issued on November 16, 2001. The Federal action considered in that opinion was the issuance of a 10-year grazing permit on the five allotments. However, because the BLM agreed to finalize their Rangeland Health Allotment Evaluations conducted during 2001, and to then reinitiate consultation regarding the continued grazing of these allotments, the 2001 biological opinion analyzed the effects of the proposed action only for the interim period. In this biological opinion we concluded that grazing activities within the interim period would not jeopardize the continued existence of the Sonoran pronghorn. Further, we concluded that these actions would not result in take of Sonoran pronghorn. The opinion included the following conservation recommendations: BLM should (1) evaluate decreasing the numbers of livestock or permanent removal of livestock from the allotments west of SR 85 to eliminate negative effects on Sonoran pronghorn; (2) work with us to investigate the potential for disease transmission from livestock and other common vector host pool species; (3) rehabilitate heavy-use recreation areas of Gunsight Wash and the base of the hills north of the Bates Well Road; (4) implement a seasonal (March 15 to July 15) emergency closure of roads, trails, and camping areas to the general public; (5) coordinate with Organ Pipe Cactus NM and Cabeza Prieta NWR to determine the extent of, and the appropriate measures to correct, the effects of erosion impacting BLM land as well as Organ Pipe Cactus NM and Cabeza Prieta NWR, resulting from historical and current land use practices on the Ajo allotments; (6) prepare a pronghorn database from all historical sightings in the agency files and support an annual program of documenting wildlife sightings (including pronghorn) by employees; (7) permanently remove livestock grazing over all, or a significant portion of the Sentinel Allotment; and (8) in coordination with the Sonoran Pronghorn Recovery Team, develop and implement a study to investigate and monitor the influences of disease (particularly those that may be transmitted by livestock) and other stressors to pronghorn.

The BLM reinitiated consultation on the Ajo allotments on April 23, 2002. The proposed action was the reissuance of 10-year grazing permits on the five allotments addressed in previous opinions. The BLM included a number of very comprehensive conservation measures which resulted in our determination that the proposed action was not likely to jeopardize the continued existence of the pronghorn. These measures included: 1) BLM will only authorize ephemeral grazing on the Cameron, Coyote Flats, Childs, and Why allotments in accordance with ephemeral use criteria in their Arizona Rangelands Standards and Guidelines and if both of the following conditions are met: a. In years where ephemeral plant production is geographically limited, ephemeral forage on the Ajo allotments is not an important part of ephemeral forage available to pronghorn, either in terms of forage quality or acreage of greenup, and b. the U.S. pronghorn population must be above 100 and increasing. 2) BLM will implement a forage enhancement project on the Cameron Allotment starting in fiscal year 2004, 3) BLM will develop a "drought policy" for the 5 allotments to more consistently guide authorization of

grazing use in Sonoran pronghorn range when drought situations occur, 4) BLM will install ground-level drinking troughs for use by pronghorn, outside of the corrals, on 3 livestock wells in the Cameron Allotment, 5) The BLM will install lay-down fences along portions of the southwestern boundaries of the Cameron Allotment to allow unimpeded passage of pronghorn. These portions of the fence will be laid down, beginning on May 1 of each year, with the reinstallation process to begin no sooner than August 31 and to be completed by September 15 of each year, 6) BLM will construct a fence to contain livestock in the northern part of the Cameron Allotment from May 1 to September 15 of each year, 7) BLM will provide this office with full descriptions, including photographs and diagrams, of all existing livestock water sources within the allotments west of SR 85. Based on the results of the study described below in 8, BLM will work with us to determine any necessary modifications to each water source to a) reduce the potential of the source to provide breeding habitat for biting midges (may require restricting access to some sources through fencing or breaching dams and allowing the sources to dry); b) provide safe access for Sonoran pronghorn; and c) ensure that such modifications do not result in adverse effects to other listed species in the vicinity (e.g., cactus ferruginous pygmy-owls may use the more vegetated water sources), 8) BLM will initiate or cooperate in development of a study of the potential for disease transmission from livestock to pronghorn in the Ajo Allotments.

In making our determination that the proposed action is not likely to jeopardize the pronghorn, we assumed that the conservation measures would be implemented fully and promptly. Under this assumption, BLM's conservation measures would eliminate any potential for take of pronghorn from the project. We issued the non-jeopardy biological opinion on September 30, 2002.

We included the following conservation recommendations: (1) The BLM should prepare a Sonoran pronghorn spreadsheet database from all historical sightings in the agency files and support an annual program of documenting wildlife sightings (including pronghorn) by employees that can be shared with other agencies and placed in the Sonoran pronghorn database that is being managed by Luke AFB; (2) the BLM should coordinate with Organ Pipe Cactus NM and Cabeza Prieta NWR to determine the extent of, and the appropriate measures to correct the effects of, erosion; (3) BLM should propose measures to improve pronghorn habitat on the Sentinel allotment, similar to those proposed herein for the other 4 allotments; and (4) BLM should find a way to develop forage enhancement plots where cattle would not have access to them. Alternatively, BLM could transfer the funds they would use to develop these plots to Cabeza Prieta NWR or DOD to develop an additional forage enhancement plot outside of the allotments.

#### Marine Corps Air Station-Yuma in the Arizona Portion of the Yuma Training Range Complex

The original biological opinion (consultation number 02-21-95-F-0114), issued on April 17, 1996, addressed all proposed and authorized actions on the BMGR by MCAS-Yuma, including proposed changes to military flights over Cabeza Prieta NWR, ongoing flights over BMGR, and operation of various training facilities such as landing strips, a rifle range, targets, a parachute drop zone, a transmitter/telemetry system, and ground support areas. MCAS-Yuma conducts Weapons Tactics Instructors (WTI) courses twice a year (March-April and October-November). During a typical WTI course, one flight/day of two to eight helicopters traverse Cabeza Prieta NWR and the BMGR within established flight corridors from west to east. Helicopters use the corridors for 5-17 days. Additional low-level fixed-wing aircraft corridors over Cabeza Prieta NWR are used for six days per course.

Ground-based activities, such as those of troops and vehicles at ground-support areas were likely to adversely affect pronghorn habitat use. Over the entire project area, ground-support areas in potentially occupied pronghorn habitat would encompass approximately 32.4 mi<sup>2</sup>. Numerous pronghorn have been located in recent years in R-2301W on the BMGR and the Cabeza Prieta NWR east of the Baker Peaks, Copper, and Cabeza Prieta mountains. In this area, ongoing and proposed

military ground-based activities have the greatest potential for adversely affecting pronghorn. Military overflights do not cause habitat degradation, but pronghorn may respond with increased heart rates and flee from aircraft, particularly low-level helicopters. The increased energy expenditure associated with flight behavior may lead to lower reproductive output and/or survival. Additionally, pronghorn may avoid flight paths, which may result in an indirect loss of useable habitat. In areas where helicopters fly particularly low and create more noise and greater visual stimuli, disturbance to pronghorn would be expected to be greater. Ordnance delivery may also adversely affect pronghorn. Pronghorn use both the North and South TACs, and ordnance, live fire, and shrapnel could potentially strike and kill or injure a pronghorn. Furthermore, pronghorn could be killed or injured during an encounter with unexploded live ordnance on the ground. MCAS-Yuma proposed measures to reduce the direct and indirect impacts of the proposed action, including measures to reduce or eliminate take of Sonoran pronghorn and to minimize destruction and degradation of habitat.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take of one pronghorn per 10 years was anticipated in the form of direct mortality, and undetermined numbers of pronghorn were anticipated to be taken in the form of harassment by low-level fixed wing and helicopter flights, military vehicles, or other activities authorized, funded, or carried out by MCAS-Yuma. The following reasonable and prudent measures were provided to minimize take of pronghorn: (1) MCAS-Yuma will develop personnel and visitors educational/information programs and operational procedures; (2) to the extent practicable, military activities shall be located outside of pronghorn habitat; and (3) incidental take resulting from the proposed action will be monitored and reported to us. The following conservation recommendations were provided: (1) continue to fund and support basic research, inventory, and monitoring of the pronghorn. In particular, MCAS-Yuma should investigate the effects of low-level helicopter and fixed wing aircraft flights over the BMGR and Cabeza Prieta NWR and ground based military activities on the behavior and physiology of the pronghorn; and (2) map noise level contours resulting from military flights over the Cabeza Prieta NWR. This map should be provided to Cabeza Prieta NWR for analysis of the effects of aircraft noise on pronghorn habitat use.

Implementation of MCAS's proposed mitigation (minimization) measures, the reasonable and prudent measures, terms and conditions, and conservation recommendations is unclear because of inadequate reporting by MCAS. We have only received annual reports for 1998 and a draft report for 1999. With few exceptions, these reports have not detailed, action by action, what steps MCAS-Yuma has taken to implement the opinion. In 1999, MCAS reported that no pronghorn habitat was modified, Range Management received no reports of Sonoran pronghorn encounters, and all air and ground crews were briefed on the requirements of the opinion. We are not aware of any incidental take of pronghorn attributable to MCAS-Yuma YTRC activities. On March 18, 1998, an amendment was requested on the consultation by MCAS-Yuma. This request slightly changed the description of the equipment and personnel to be used in the Stoval Field exercise area. We determined that the changes would have no additional effects not already anticipated in the biological opinion.

The 1996 biological opinion was remanded to us by the Court on February 12, 2001. During consultation, MCAS-Yuma proposed 26 conservation measures aimed at the reduction of adverse effects of the proposed action on the environment, including impacts to the Sonoran pronghorn (Dames and Moore 1995; MCAS -Yuma 1995, 1997, 2001; letter from MCAS-Yuma to us dated October 15, 2001). We concluded that the proposed action would not jeopardize the continued existence of the Sonoran pronghorn. Further, we anticipated that no more than 6 Sonoran pronghorn would be incidentally taken as a result of the proposed action. The incidental take was expected to be in the form of harassment. This incidental take provision will be reviewed concurrent with subsequent reviews of the BMGR INRMP, which will occur every five years. The following reasonable and prudent measure was provided to minimize take of pronghorn: MCAS-Yuma shall modify low-level helicopter use to avoid areas of significant pronghorn use to minimize adverse effects from helicopters on the pronghorn and its habitat, particularly areas important for fawns and their mothers. In addition the

following conservation measures in regard to Sonoran pronghorn were suggested: MCAS-Yuma should (1) continue to fund and support basic research, inventory, and monitoring of the pronghorn, (2) fund or staff Sonoran pronghorn recovery projects (a list of appropriate projects was provided as an appendix to the biological opinion), (3) eliminate use of ground support areas 43, 44, 45, and 67 because they are in significant use areas of the pronghorn, including areas used by fawns and their mothers, and (4) coordinate with Luke AFB to implement more intensive monitoring of the North and South TACs. We issued the final remanded biological opinion on November 16, 2001.

### Organ Pipe Cactus NM General Management Plan

The biological opinion (consultation number 02-21-89-F-0078), issued June 26, 1997, addressed implementation of Organ Pipe Cactus NM's GMP. The purpose of the GMP is to guide management for the next 10-15 years. Plan elements included: (1) working with Arizona Department of Transportation to ensure continued travel and commerce on SR 85 while enhancing resource protection, (2) seeking designation of Organ Pipe Cactus NM as the Sonoran Desert National Park, (3) establishment of partnerships to share facilities, staff, and costs in Why and Lukeville, (4) increased wilderness and development of an interagency wilderness and backcountry management plan, (5) changes in trails at Quitobaquito, (6) changes in facilities in the Twin Peaks area, (7) increased primitive camping and designated trails, and (8) full implementation of the Organ Pipe Cactus NM Cultural Resources Management Plan.

To reduce adverse effects on pronghorn, Organ Pipe Cactus NM proposed the following: (1) pursue an agreement with Arizona Department of Transportation to establish a vehicle for continued communication regarding road-related issues, construct underpasses at known movement corridors to facilitate safe passage of pronghorn under the highway, and establish a program to explore other measures to better understand and subsequently reduce the impacts of SR 85 on pronghorn; (2) continue working with the Arizona Department of Public Safety to enforce the existing speed limit within Organ Pipe Cactus NM; (3) convert the bottom strands of Organ Pipe Cactus NM's north and south boundary fences to smooth wire to encourage pronghorn movements between Organ Pipe Cactus NM and surrounding areas; (4) educate motorists about the plight of pronghorn using a variety of interpretive media in an effort to encourage lower speeds and increased awareness of wildlife use of the highway corridor; (5) continue to serve as a member of the Interagency Core Working Group for Sonoran pronghorn recovery and implement activities outlined in the recovery plan, including development of a monitoring program; and (6) monitor visitor use and restrict access where necessary to minimize the potential for disturbance to pronghorn.

Recreational activities at Organ Pipe Cactus NM include hiking, camping, horse-back riding, and biking. These activities can disturb pronghorn and degrade habitat. Maintaining and/or adding hiking trails at Organ Pipe Cactus NM is likely to maintain or increase visitor presence in pronghorn habitat, resulting in disturbance to pronghorns. All proposed facilities would be located within areas of existing development and would involve relatively small tracts of land surrounded by larger areas of undisturbed habitat. However, development of facilities that result in increased visitor use may adversely affect the pronghorn. Increased use of some frontcountry and backcountry areas has the potential to adversely affect pronghorn if it causes an alteration in behavior or habitat use. Increased visitation to Organ Pipe Cactus NM was also expected to result in increased traffic along SR 85, adding to the barrier effect of existing traffic patterns. Approximately 22 miles of SR 85 lie within Organ Pipe Cactus NM. We concluded that the highway is a deterrent to expanding pronghorn populations, and resulting modified behavioral patterns may lead to a reduction in genetic exchange, reduced viability, and therefore a reduction in the ability of pronghorn to adapt to environmental change.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take in the form of injury or death to one pronghorn associated with traffic on SR



85 was anticipated. The following reasonable and prudent measures were provided to minimize take of pronghorn: (1) work with agencies to implement actions to reduce effects of current and future traffic patterns on SR 85; (2) modify fences for pronghorns; (3) educate motorists on pronghorn vulnerability to traffic; and (4) monitor use and restrict access where necessary to minimize pronghorn disturbance. The following conservation recommendation was provided: the NPS should continue to contribute to multi-agency recovery efforts and help implement appropriate management actions as new information becomes available.

Since completion of the 1997 consultation, it is unclear to what extent Organ Pipe Cactus NM has begun to reduce the impacts of traffic speed and volume along SR 85. Organ Pipe Cactus NM cites “installation of new road signs” and construction of “interpretive waysides” as part of the “completed or continuing” projects of the GMP (NPS 2001). According to Organ Pipe Cactus NM personnel, these projects are in the planning stages (T. Tibbitts, pers. comm. 2001). Organ Pipe Cactus NM has remained a member of the Recovery Team, and has continued to aid in implementation of recovery plan activities, including population monitoring and radiotelemetry studies. The livestock fence on the boundary between Organ Pipe Cactus NM and Cabeza Prieta NWR has been removed. The livestock fence along Organ Pipe Cactus NM’s northern boundary with BLM lands west of SR 85 has been modified for pronghorn. It is unclear what, if anything, Organ Pipe Cactus NM has done to reduce the impacts of SR 85 through public education. Organ Pipe Cactus NM has closed the Pozo Nuevo Road seasonally, partly in response to pronghorn use. However, concrete Jersey barriers were installed to block the road, which resulted in habitat destruction as illegal traffic expanded out into the desert to go around the barrier. Organ Pipe Cactus NM law enforcement has been working with Border Patrol to address illegal traffic, and has incorporated pronghorn radiotelemetry data into their management of park traffic with some degree of success (T. Tibbitts, pers. comm. 2001). No incidental take of pronghorn associated with the proposed action has been documented.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. The GMP had changed since the 1997 plan was released, most notably with regard to GMP projects which were ongoing or had been completed, and the addition of new projects. To reduce adverse effects, NPS also included 14 conservation measures for Sonoran pronghorn in its proposed action. These conservation measures included: (1) closing Pozo Nuevo Road to public use at its intersection with Puerto Blanco Drive from March 15 to July 15; (2) closing Bates Well Road to public use at the northern monument boundary from March 15 to July 15; (3) closing North Puerto Blanco Drive at a point approximately 5.1 miles from the Visitor’s Center, and also at its intersection with Pozo Nuevo Road from April 1 to July 15; (4) implementing a pronghorn monitoring program and closing areas within a 5 mile diameter of known pronghorn locations, specifically targeting Puerto Blanco Road for potential closure between March 1 and March 31; (5) restricting backcountry use, from March 15 to July 15, to areas east of SR 85 and south of North Puerto Blanco Drive; (6) limiting future development to the area south of North Puerto Blanco Drive and east of Senita Basin Road/Baker Mine Trail/Dripping Springs Mine Trail and limiting timing of construction to occur outside the pronghorn fawning and summer dry seasons (March 15 to July 15); (7) establishing a 3-year experimental pronghorn crossing zone on SR 85 from milepost 67 to 71, consisting of a temporary speed limit reduction to 35 - 45 mph from 0400 - 0900 hours seasonally, including a monitoring program to assess effectiveness; (8) removing the north boundary fence if BLM agrees to remove livestock from the Cameron and Coyote Flat allotments for a period of at least 20 years, including at least a 2 year advance notice of BLM’s intention to return livestock to these areas; (9) placing temporary water sources in key areas, primarily during the dry season, and including a monitoring program to assess effectiveness of temporary waters; (10) continuing to support pronghorn radiotelemetry; (11) implementing erosion control measures utilizing a hydrologist/sedimentologist; (12) maintaining and expanding a non-native species removal program including removal of bufflegrass and Sahara mustard; (13) providing an annual report of pronghorn conservation efforts; and (14) contributing to the 51 recovery projects identified by the Sonoran pronghorn recovery team (Appendix 1) within NPS

regulations, either by providing in-kind contributions or by commitment of funds. Consequently, we did not anticipate any incidental take of Sonoran pronghorn as a result of the proposed action. However, we did specify the following conservation recommendations: NPS should (1) continue to fund and support basic research, inventory, and monitoring of the Sonoran pronghorn; and (2) explore additional methods of ameliorating the barrier effects of SR 85, such as establishing a lower speed limit and investigating the feasibility of installation of underpasses on SR 85.

Implementation of the conservation measures listed above has been incomplete since the remanded opinion was issued on November 16, 2001. The Bates Well Road and Pozo Nuevo road closures, and backcountry closures have been implemented as proposed. NPS did not close North Puerto Blanco Road. NPS did not implement the pronghorn monitoring program in 2002, although sporadic monitoring by NPS personnel did take place. NPS will implement the monitoring program in 2003. A new full-time employee will begin monitoring the Monument in April 2003 for the presence of pronghorn. As agreed, no development occurred in the pronghorns range with the exception of a new, temporary Ranger/Border Patrol station established at Bates Well. NPS did not establish a 3-year experimental pronghorn crossing zone on SR 85 from milepost 67-71, with temporary speed limit reductions; that measure was not implemented in 2002 because of objections by the Arizona Department of Transportation and the Federal Highway Administration. Temporary waters were placed on Organ Pipe Cactus NM in July 2002, and a monitoring program was initiated to determine their effectiveness; NPS plans to place temporary waters in 2003 in the summer dry season. NPS continues to maintain and has expanded a program to remove non-native buffleggrass and Sahara mustard. In January 2003, NPS provided an annual report to the Fish and Wildlife Service summarizing its efforts to conserve pronghorn and other species in 2002. NPS contributed to implementation of the 51 recovery projects in Appendix 1 in 2002. A hydrologist began work in 2002 to assess soil erosion issues. Organ Pipe Cactus NM modified about one mile of its far southeastern international boundary fence, to make it more conducive to pronghorn movement. Also, in early 2002, Organ Pipe Cactus NM removed approximately 3 miles of barbed-wire fence that was lying on the ground in the southwestern corner of the Monument because it was thought to pose an entanglement hazard to pronghorn.

#### Luke AFB Use of Ground-Surface and Airspace for Military Training on the BMGR

The biological opinion (consultation number 02-21-96-F-0094), issued August 27, 1997, addressed military use of the airspace above and the ground space on the eastern half of the BMGR by Luke AFB. At the time of the consultation, about two-thirds of the BMGR was located on lands managed by the Department of Defense and BLM, with the remaining third located within Cabeza Prieta NWR. Approximately 5 percent (7.6 percent, if not including Cabeza Prieta NWR) of the range had been impacted by military activities. Military activities within the area of overlap with the Cabeza Prieta NWR were limited to use of airspace and operation of four Air Combat Maneuvering Instrumentation sites. The eastern part of the BMGR is known as the Gila Bend segment. Military activities occurring within the Gila Bend segment are managed by Luke AFB and include: airspace use, four manned air-to-ground ranges, three tactical air-to-ground target areas, four auxiliary airfields, Stoval Airfield, and explosive ordnance disposal/burn areas.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. During each 10-year period of the project, take was anticipated in the form of harassment that was likely to injure up to two pronghorn and in the form of death of at least one pronghorn. The following reasonable and prudent measures were provided to minimize take: (1) minimize impacts of activities on pronghorn; (2) minimize habitat loss, degradation, and fragmentation of pronghorn habitat; (3) monitor and study reactions of pronghorn on the BMGR to military activities; and (4) determine the level of incidental take that results from the project. The following conservation recommendations were provided: (1) Luke AFB should pursue funding for all research needs that are identified for

implementation by Department of Defense in the final revision of the pronghorn recovery plan, as well as all research needs that are now and in the future identified by the Sonoran Pronghorn Core Working Group; (2) Luke AFB should conduct and/or fund research to determine the effects of low-level flights on free-ranging pronghorn and use the information to evaluate flight ceilings and flight corridors (i.e., Military Training Routes) over Cabeza Prieta NWR; and (3) Luke AFB should fund and implement an ecosystem partnership for managing the Sonoran Desert to determine other conservation needs in the area.

Implementation of the reasonable and prudent measures have been documented in their annual reports; we are in receipt of the 1998, 1999, and 2000 reports. We are not aware of any take of pronghorn confirmed attributable to Luke AFB use of the ground-surface and airspace on the BMGR. A pronghorn found dead near a target may have been strafed, but it may also have died from other causes.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. During the course of this consultation, Luke AFB made substantial commitments to minimize the effects of their activities on the Sonoran pronghorn, and additionally committed to implementing a variety of recovery projects recommended by the Sonoran Pronghorn Recovery Team. A total of 12 conservation measures were added to the proposed action. We concluded that the proposed action, including conservation measures, would not jeopardize the continued existence of the Sonoran pronghorn. We further anticipated that no more than 3 Sonoran pronghorn would be incidentally taken as a result of the proposed action. The incidental take was expected to be 1 pronghorn in the form of death and 2 pronghorns in the form of harassment. The incidental take provision will be reviewed concurrent with subsequent reviews of the Barry M. Goldwater INRMP, which will occur every five years. To minimize impacts to Sonoran pronghorn, we provided the following reasonable and prudent measure: Luke AFB shall expand efforts to monitor Sonoran pronghorn on the tactical ranges to minimize the likelihood of adverse impacts to the pronghorn from military training exercises. Additionally, the following conservation recommendations were suggested: Luke AFB should (1) pursue funding for all research needs that are identified for implementation by Luke AFB in the final revision of the Sonoran pronghorn recovery plan, as well as all research needs that have been concurrently or subsequently identified by the Sonoran Pronghorn Recovery Team, (2) conduct and/or fund research to determine the effects of low level flights by helicopters on free-ranging pronghorn and use the information to evaluate flight ceilings and low-level flight corridors over Cabeza Prieta NWR, (3) prepare a Sonoran pronghorn spreadsheet database from all historical sightings in Luke AFB files and support an annual program of documenting Sonoran pronghorn sightings by employees, (4) study the feasibility of moving or adding targets north of the Crater Range for use when TAC targets are closed due to the presence of pronghorns, and (5) continue efforts to implement the use of modular targets and electronic scoring systems to reduce the number of strafing targets.

In the November 16, 2001, biological opinion, one term and condition was provided to implement the reasonable and prudent measure described above. Luke AFB has since completed this term and condition by updating the range operating instructions to reflect the conservation measures in the proposed action. Luke AFB also continues to support the recovery of the Sonoran pronghorn through the biological monitoring contract and management of their previously obligated funds. Also in the opinion, we discussed a number of conservation measures that Luke AFB agreed to add to their proposed action. During FY 2002, Luke AFB did not budget further funds for Sonoran pronghorn management; however, they are assisting AGFD in managing the currently obligated funds.

#### Western Army National Guard Aviation Training Site Expansion Project

The non-jeopardy biological opinion for the Western Army National Guard Aviation Training Site (WAATS) (consultation number 02-21-92-F-0227) was issued on September 19, 1997. The purpose

of WAATS is to provide a highly specialized environment to train ARNG personnel in directed individual aviator qualification training in attack helicopters. The WAATS expansion project includes: (1) expansion of the existing Tactical Flight Training Area which includes establishing four Level III touchdown sites, (2) development of the Master Construction Plan at the Silver Bell Army Heliport, and (3) establishment of a helicopter aerial gunnery range for use by the ARNG on East TAC of the BMGR. East TAC is outside the current range of the pronghorn.

This 1997 biological opinion did not address the pronghorn, but, in the Court's opinion, should have and was therefore remanded by the Court. Per the final EIS for WAATS, ARNG use of East TAC did not cause existing training to shift to North or South TACs because Luke AFB eliminated F-15E training at BMGR, concentrating on F-16 air-to-air and air-to-ground training. Therefore, the EIS did not consider impacts to the pronghorn and none were anticipated. All activities that are part of the proposed action occur outside the current range of the pronghorn, with the exception of training at North TAC. Training at North TAC only occurs when East TAC is closed for annual maintenance and EOD clearances. Effects to pronghorn at North TAC are minimized by monitoring protocols established by Luke AFB. Training at East TAC could preclude recovery of historical habitat if the many other barriers that prevent pronghorn use of East TAC were removed.

The final remanded biological opinion, issued in 2001, found that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn. No incidental take was anticipated. The proposed action included 8 conservation measures aimed at the reduction of adverse effects to Sonoran pronghorn and its habitat. The proposed measures minimized, but did not eliminate, habitat disturbance from the ARNG that would occur on North TAC. A single conservation recommendation was included, which states: ARNG should continue to contribute to funding and supporting basic research, inventory, and monitoring of the pronghorn.

## **F. Summary of Activities Affecting Sonoran Pronghorn in the Action Area**

Historically, livestock grazing, hunting or poaching, and development along the Gila River and Rio Sonoyta were all probably important factors in the well-documented Sonoran pronghorn range reduction and apparent population decline that occurred early in the 20<sup>th</sup> century. Historical accounts and population estimates suggest pronghorn were never abundant in the 20<sup>th</sup> century, but recently, the estimated size of the population in the action area declined from 179 (1992) to 21 (December 2002). At 21, genetic diversity is expected to erode, and the sub-population is in imminent danger of extirpation due to human-caused impacts, or natural processes, such as predation or continued drought. Although the proximate cause of the decline during 2002 was drought, human activities limit habitat use options by pronghorn and increase the effects that drought have on the sub-population. The U.S. pronghorn sub-population is isolated from other sub-populations in Sonora by a highway and the U.S./Mexico boundary fence, and access to the greenbelts of the Gila River and Rio Sonoyta, which likely were important sources of water and forage during drought periods, has been severed.

Within its remaining range, the pronghorn is subjected to a variety of human activities that disturb the pronghorn and its habitat, including military training, increasing recreational activities, grazing, increasing presence of undocumented immigrants and smuggling, and in response, increased law enforcement activities. MCAS-Yuma (2001) quantified the extent of the current pronghorn range that is affected by various activities and found the following: recreation covers 69.6 percent of the range, military training on North and South TACs covers 9.8 percent, active air-to-air firing range covers 5.8 percent, proposed EOD five-year clearance areas at North and South TACs and Manned Range 1 cover 1.0 percent, and MCAS-Yuma proposed ground support areas and zones cover 0.29 percent. In addition, livestock grazing occurs over 5.6 percent of the pronghorn's current range (NPS 2001, Bright *et al.* 2001); a total of 860 miles of roads occur in the current range (MCAS-Yuma 2001), and foot and vehicle traffic by undocumented immigrants and smugglers occurs at an increasing frequency

throughout the area. Organ Pipe Cactus NM (2001) identified 165 human activities in the range of the pronghorn, of which 112 were adverse, 27 were beneficial, 26 had both adverse and beneficial effects, and 4 had unknown effects. Organ Pipe Cactus NM (2001) concluded that in regard to the pronghorn, “while many projects have negligible impacts on their own, the sheer number of these actions is likely to have major adverse impacts in aggregate.”

The current range of the pronghorn in the U.S. is almost entirely comprised of lands under Federal jurisdiction; thus authorized activities that currently affect the pronghorn in the action area are almost all Federal actions. Illegal, unauthorized foot traffic and off-road vehicle activity have been and continue to be significant non-Federal threats to the pronghorn and its habitat. Prior to November 2001, in seven of 12 biological opinions issued by FWS that analyzed impacts to the pronghorn, we anticipated that take would occur. In total, we anticipated take of five pronghorn in the form of direct mortality every 10-15 years, and an undetermined amount of take in the form of harassment. Given the small and declining population of pronghorn in the U.S., take at the levels anticipated in the biological opinions would constitute a substantial impact to the population.

Changes made in the biological opinions in 2001 reduced the amount or extent of incidental take anticipated to occur from Federal actions. In total, we anticipated take in 5 of 13 (the original 12 opinions plus the ARNG opinion that now considers effects on the pronghorn) biological opinions issued for the Sonoran pronghorn. This amount of take is less than that anticipated in the original opinions because FWS and the Federal agencies have worked together to minimize the effects of ongoing and proposed activities on the Sonoran pronghorn. With the exception of likely capture related deaths during telemetry studies, we are unaware of any confirmed take resulting from the Federal actions described here.

We believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors, including habitat degradation and disturbance within the pronghorn’s current range resulting from a myriad of human activities, exacerbated by periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the action area.

## **EFFECTS OF THE PROPOSED ACTION**

### **Habitat Loss or Modification**

Some actions in the NPS GMP will result in destruction of pronghorn habitat. Development such as new construction of trails, roads, buildings, etc., as well as the expansion of existing facilities, including existing roads and trails, will cause habitat loss and/or modification. Completed and planned GMP roadway construction projects include construction of interpretive waysides at scenic drive entrances, trenching and widening of South Puerto Blanco Drive, construction of approximately 800 feet of new roadway at Twin Peaks, installation of a turn-around and approximately 400 feet of new road on Puerto Blanco Drive, and construction of rest areas or pull-outs on SR 85. Completed and planned GMP trail construction includes 8 new trails totaling 8.9 miles. New trails being established in pronghorn habitat include the Red Tanks Tinaja to Milton Mine Trail, and Baker Mine to Milton Mine Trail.

Construction of new buildings would occur primarily in the Twin Peaks area, including a new Visitor Center, a new sciences and resource management center, new ranger operations and fire station building, new parking area for employees, new maintenance area, new community center and a new utility building. These types of activities would have minor adverse effects to pronghorn through direct loss or modification of habitat. Indirectly though, the Twin Peaks developments will serve to increase the footprint and amount of visitor use of this area, resulting in increased overall disturbance to pronghorn.

Roads and associated soil erosion are degrading habitat. Some sections of road are deeply entrenched and are becoming more so. The Bates Well Road near the Pozo Nuevo Road and the North Boundary Road west of Armenta Ranch, are examples of entrenched road sections in pronghorn habitat. Entrenched roads have various impacts, including changes to natural surface water flow patterns, gullying and other accelerated erosion features, and destabilization of ancient soil surfaces and topography. Vegetation patterns and productivity can change as a result of these impacts. Thus, the physical impacts of roads (versus behavioral impacts discussed below) are adverse and can be long term. The NPS has proposed to fund and implement a program to address soil erosion issues, to include surveys and recommendations by a hydrologist/sedimentologist.

NPS has proposed limiting development to the area south of North Puerto Blanco Drive and east of Senita Basin Road/Baker Mine Road/Dripping Springs Mine Trail, as a conservation measure for pronghorn. Development would not occur in other areas of Organ Pipe Cactus NM typically used by pronghorn. Within the construction area, the only project being considered for the future is a new trail around Pinkley Peak. This project would result in some loss of pronghorn habitat from the direct footprint of the project. Project construction would take place outside of the fawning and summer dry seasons (March 15-July 15). NPS has not provided an estimate of the total amount of habitat that would be lost or modified by this project.

A number of NPS actions are likely to result in beneficial effects to pronghorn habitat. Actions to remove and/or control buffelgrass will allow natural vegetation processes within Organ Pipe Cactus NM to return, thereby providing more forage for pronghorn. Removal of buffelgrass also reduces the likelihood of fire, thereby protecting pronghorn habitat. The NPS has proposed to continue to fund and expand this program to include additional non-native species such as Sahara mustard. Control of trespass livestock into Organ Pipe Cactus NM will reduce competition for available forage and decrease the potential of disease transfer. Law enforcement efforts to control illegal immigrant and drug traffic will decrease the amount of human presence in pronghorn habitat, thereby allowing pronghorn to make use of the habitat available within Organ Pipe Cactus NM. The NPS plans to acquire 1,280 acres of State land within Organ Pipe Cactus NM. Half of this acreage is an area known to be used by pronghorn; the remainder provides suitable summer habitat, but lies east of SR 85.

The NPS proposes initiation of a program to place temporary waters for pronghorn around Organ Pipe Cactus NM to offset pronghorn water needs, particularly in dry periods, and they will also monitor these waters to assess success. Fox *et al.* (2000) found that while pronghorn water budgets could be met through forage alone, existing conditions within the range of the species do not provide sufficient forage quality to accomplish this. A pilot study by AGFD found that temporary waters (portable 15-20 gallon containers) were used by Sonoran pronghorn. This program will be beneficial to pronghorn and will serve to augment existing habitat. These beneficial actions are expected to offset adverse impacts to the pronghorn from habitat loss and modification.

### Curtailment of Range and Disturbance

A number of actions and activities of the GMP contribute to the curtailment of the range of the pronghorn. Other GMP actions have beneficial effects by reducing the amount or extent of range curtailment. Curtailment of the pronghorn's range can be long-term to short-term in duration, from negligible to major in intensity, and from localized to regional in geographic context.

Currently, SR 85 bears heavy tourist and commercial traffic, with a posted speed limit of 65 mph. SR 85 curtails the pronghorn's range by acting as a barrier to movement east of the highway. As traffic volumes and speeds increase on SR 85, it becomes more impassable to pronghorn movement. Organ Pipe Cactus NM constitutes the eastern edge of the current range of the pronghorn (Figure 2). Pronghorn historically crossed SR 85 to use bajada habitats in eastern portions of Organ Pipe Cactus

NM. A recent remote-sensing habitat analysis indicated that suitable pronghorn habitat still exists east of SR 85 in Organ Pipe Cactus NM (Marsh *et al.* 1999). Increasing speeds and volume of traffic on SR 85 have likely increased its effectiveness as a barrier over the years (Service 1998a). Few pronghorn have been found east of SR 85 in the last 30 years. In 1972, a male pronghorn was found dead near the Ajo Mountain Loop Drive, east of SR 85. On June 12, 1996, an adult doe pronghorn was observed running west off the right-of-way at the approach of a vehicle on the north end of the Crater Range (R. Barry, Luke AFB, pers. comm. 1996). There also exists an unconfirmed report of four Sonoran pronghorn attempting to cross SR 85 in August 1993 approximately 1 mile north of the Organ Pipe Cactus NM visitor center. A juvenile pronghorn crossed the highway (two lanes) to the east, but with the approach of a vehicle, ran back across the road to rejoin a group of three pronghorn (T. Ramon, Organ Pipe Cactus NM, pers. comm. 1993). The only radio-collared pronghorn found east of SR 85 were two females during the summer of 2002, one of which died east of the highway. Road shoulder maintenance (e.g., widening) may increase the barrier effect.

The NPS has proposed to offset the barrier effect of SR 85. A three-year experimental pronghorn crossing zone will be established in the northern portion of the Valley of the Ajo from SR 85 milepost 67 to 71. In the crossing zone, the speed limit will be reduced to 35 or 45 mph on a seasonal basis, and at times of day when pronghorn are most likely to cross (e.g., 0400 - 0900 hours). The zone will be monitored by NPS personnel to assess pronghorn use of the crossing zone. This project has potential to benefit pronghorn by ameliorating the barrier effect of SR 85.

Overall, pronghorn generally retain freedom of movement throughout Organ Pipe Cactus NM west of SR 85 to Cabeza Prieta NWR and BLM lands to the north. Still, pronghorn cannot fully use the available habitat within Organ Pipe Cactus NM west of SR 85. Sonoran pronghorn are nomadic animals. They survive the harsh conditions of the desert by roaming widely, exploiting wide-spread and often ephemeral resources of food, water, and shelter (Hoffmeister 1986, Hervert *et al.* 1996, Bright *et al.* 2001). An individual pronghorn may move many tens of miles in several days, simply following or seeking favorable conditions that result from localized rains and green areas. Curtailment of pronghorn range equates to restriction of their nomadic movements and significantly reduces their ability to survive. For example, Sonoran pronghorn tend to move southeast and upslope as the hot, dry weather of April - July develops. The animals appear to be making this movement to access more heavily vegetated desert scrub, where they find a wide variety of forage that allows them to survive through the annual spring drought (Hervert *et al.* 1996). SR 85, the boundary fence, and Mexico Highway 2 are barriers to movements of pronghorn to the east, north, and south, respectively. Smaller roads within Organ Pipe Cactus NM west of SR 85 act as intermittent barriers. Fences are also barriers to movement, and probably confound movements within the area enclosed by these major roadways. The aforementioned seasonal closures will help offset these effects.

A recent study by Krausman *et al.* (2001) reported that Sonoran pronghorn reacted to ground disturbances (vehicles or people on foot) with a change in behavior 37 percent of the time, resulting in the animals running or trotting away 2.6 percent of the time. Wright and deVos (1986) noted that Sonoran pronghorn exhibit "a heightened response to human traffic" as compared to other subspecies of pronghorn. They noted that "once aware of an observer, Sonoran pronghorn are quick to leave the area. One herd was observed 1.5 hours later 11 miles north of the initial observation in October 1984. Other pronghorn have run until out of the observer's sight when disturbed." Hughes and Smith (1990) noted that on all but one occasion, pronghorn ran from the observers vehicle and continued to run until they were out of sight.

Disturbance and flight of ungulates are known to result in a variety of physiological effects that are adverse, including elevated metabolism, lowered body weight, reduced fetus survival, and withdrawal from suitable habitat (Geist 1971, Harlow *et al.* 1987). Frequent disturbance imposes a burden on the energy and nutrient supply of animals (Geist 1971), which may be exacerbated in harsh environments

such as those occupied by Sonoran pronghorn. Krausman *et al.* (2001) also found that fawns and their mothers were more sensitive to human disturbance than other life stages of Sonoran pronghorn.

Causes of disturbance of pronghorn within Organ Pipe Cactus NM include: recreation, on-the-ground management activities, vehicles, aircraft, and movements of large numbers of undocumented migrants and smugglers. According to Organ Pipe Cactus NM's website (<http://www.nps.gov/orpi/pphtml/facts.html>), a total of 318,668 recreational visits to the monument occurred in 2001. Human presence may cause Sonoran pronghorn to move from an area, thereby denying pronghorn access to that specific site for what may be crucial ecological functions (e.g. foraging, bedding, seeking thermal shelter, seeking mates, seeking fawning sites, seeking areas of relative safety from predators). Causing pronghorn to move also increases their physiological demands by expending calories and metabolic water. These may be critical stresses in seasonal hot-dry periods and in extended periods of low forage availability. Disturbance may also lead to mortality. Causing a pronghorn to be alarmed or agitated, or flee from a disturbance may make it vulnerable to predator attack. This is especially true for fawns and females during the fawning season.

Organ Pipe Cactus NM's south boundary fence is a standard livestock fence, and probably inhibits or prevents pronghorn passage. However, the greater impact to movement in this area is likely Mexican Highway 2, located adjacent, parallel, and just to the south of the fence. The highway and the fence, in combination, prevent pronghorn from moving between the two countries and prohibit the U.S. sub-population from accessing available habitat and interbreeding with pronghorn in Mexico. The northern boundary fence between Organ Pipe Cactus NM and BLM lands east of SR 85 is a standard livestock fence which is a barrier to pronghorn movement, but SR 85 is more of a barrier to pronghorn movement. The BLM boundary fence west of SR 85 has been modified to provide pronghorn access. Nevertheless, this fence probably inhibits pronghorn use of BLM lands more so than if it were removed altogether. Limiting movement into BLM lands minimizes the pronghorn's range and subsequently limits their ability to find forage during dry seasons and years. NPS has proposed to remove fencing between their land and BLM lands if BLM were to remove cattle for a period of at least 20 years from the Cameron and Coyote Flats, and provide at least a 2 year advance notice of their intention to return livestock to these areas. The eastern boundary of Organ Pipe Cactus NM is primarily the high, rugged, crest line of the Ajo Mountains. This boundary is fenced only in high saddles where domestic livestock might range; the remainder of that boundary is nearly vertical topography. Sonoran pronghorn are not likely to occur in this area.

Some corridors of human activity may act as occasional barriers to pronghorn movement. The graded dirt roads west of SR 85 are frequently crossed by pronghorn (AGFD unpubl. telemetry data; NPS staff, pers. obs.). However, during periods of heavy vehicular traffic (e.g. during exceptional wildflower blooms), human use of these roads may temporarily inhibit pronghorn movement. Likewise, human use of the backcountry and various trails west of SR 85 could also cause disturbance to pronghorn. These uses peak during the spring (T. Tibbitts, pers. comm. 2001), which is also the fawning season of the pronghorn. Creation of new roads and trails, or expansion of existing roads and trails in pronghorn habitat (e.g., North Puerto Blanco Drive expansion, Pinkley Peak trail, creation of waysides and pullouts on SR 85) will amplify this effect. The fawning season, and the subsequent summer dry season, generally February through early July, is the season when pronghorn are most likely to be in Organ Pipe Cactus NM, presumably because pronghorn prefer bajada habitats during fawning, which are common in the Monument, and Organ Pipe Cactus NM provides better forage than other parts of the pronghorn's U.S. range during the summer dry periods. Additionally, pronghorn fawns and mothers with fawns are much more sensitive to disturbance (Krausman *et al.* 2001). Frequent use of trails and roads in Organ Pipe Cactus NM creates disturbance that acts as barriers to pronghorn movement. Because a great deal of visitors come in the late winter and early spring, the resulting disturbance barriers may limit pronghorn access within Organ Pipe Cactus NM at a time when pronghorns need it most.



Some centers of human activity are likely to curtail the pronghorn's range. The Twin Peaks developed area is an area of permanent human activity. The progressive development of the Twin Peaks area has already affected several hundred acres of potential pronghorn habitat. These types of activities can inhibit pronghorn from using adjacent landscapes (Bright and van Riper III 2000). The GMP proposes some new construction in the Twin Peaks area such as a ranger and fire station, parking lots, and other buildings. This will increase the footprint of the Twin Peaks area, increasing the zone of pronghorn disturbance caused by this center of activity. Closure of adjacent areas will benefit the pronghorn and help reduce these curtailment effects.

NPS has proposed limiting development south of North Puerto Blanco Drive and east of Senita Basin Road/Baker Mine Road/Dripping Springs Mine Trail. Within the area, only two projects would be considered: widening the first 5.1 miles of North Puerto Blanco Drive to allow two-way traffic and constructing a new trail around Pinkley Peak. If constructed, these projects could greatly increase disturbance to pronghorn by providing greater access to this area of the park. An increase in disturbance in this area could have a detrimental effect to pronghorn because an important movement corridor, the pass between the La Abra Plain and the Valley of the Ajo, is in the immediate area.

Law enforcement control of illegal immigrant and drug traffic has resulted in short- to long-term beneficial effects of varying intensity by reducing illegal foot and vehicle traffic and thereby reducing habitat degradation and disturbance of pronghorn. However, these law enforcement efforts may also push such traffic into backcountry habitat areas. Administrative use of Armenta Road is ongoing for law enforcement purposes, and the vehicular traffic of NPS vehicles causes disturbance to pronghorn, as does NPS emergency operations (e.g., high-speed vehicle chases) throughout Organ Pipe Cactus NM.

Recreation is recognized as having significant environmental impacts on wildlife (Knight and Gutzwiller 1995). Non-motorized human recreation activities, such as hiking and rock climbing, have increased in popularity, are continually expanding, and are extensive in nature. These activities have the ability to disrupt wildlife in many ways, particularly by displacing animals (Knight and Gutzwiller 1995). McArthur *et al.* (1982) reported elevated heart rates and flight among mountain sheep approached by humans. Mountain sheep reactions to hikers were greater than reactions to road traffic, helicopters, or fixed wing aircraft. Peak levels of hiking and skiing displaced chamois from nutritionally important habitats for prolonged periods (Hamr 1988). Orienteering activities in Denmark displaced roe and red deer from their home ranges; however, the animals eventually returned to these areas after disturbances ceased (Jeppesen 1987a, 1987b). Cassier *et al.* (1992) found that elk in Yellowstone National Park moved an average of 1.1 mile to avoid cross country skiers, often moving to another drainage. Krausman *et al.* (2001) found that the effects of disturbance from vehicular use of roads on Sonoran pronghorn was a more significant impact than disturbance from aircraft (helicopter, jet, and fixed wing). Creation of new roads and trails and expansion of existing roads and trails in pronghorn habitat (e.g., North Puerto Blanco Drive expansion, Pinkley Peak trail) will create new areas of human disturbance and serve to amplify the already significant disturbance effects to pronghorn from visitor use in this area.

Part of the proposed action involves relocating powerlines and placing powerlines underground. This would likely result in a small amount of disturbance to pronghorn and their habitat. However, relocating the powerline corridor and revegetating the disturbed area may result in reducing use of this corridor by undocumented migrants and smugglers.

Sonoran pronghorn in Organ Pipe Cactus NM are subjected to disturbance events that vary substantially in intensity and are sporadic in time and place. Viewed as a whole, these actions may result in a nearly daily exposure to disturbance. For example, the graded roadways in western portions of Organ Pipe Cactus NM may have adverse impacts to the pronghorn at a minor to moderate level of

intensity, but when added to park visitation pressures from hikers, vehicular use of roads, and law enforcement, widespread disturbance takes place. Disturbance of this intensity and frequency may result in physiological stress to pronghorn, excessive movements, and avoidance of areas that might otherwise be preferred habitat. Ultimate consequences may include diminished physical fitness, reduced adult survival, reduced breeding capability, reduced fawn survival, susceptibility to predation, and death. Seasonal closures of roads and backcountry areas should effectively minimize disturbance of pronghorn from visitors during the fawning and summer dry seasons.

To address the effects of curtailment of range and disturbance, Organ Pipe Cactus NM has proposed a monitoring and closure program to protect pronghorn, especially during the critical fawning season. North Puerto Blanco Drive will be closed to public use from April 1 to July 15. The Bates Well Road and Pozo Nuevo Road will also be closed to public use from March 15 to July 15. Also, a monitoring program will be employed, and any pronghorns detected in Organ Pipe Cactus NM will result in a 5-mile diameter buffer zone around the animal which will be closed to all activity, except for a minimal amount of administrative traffic. This monitoring program would focus on areas and seasons where a high potential for impacts to pronghorn exists. For example, recreational use of North Puerto Blanco Drive during the month of March. Additionally, during the pronghorn fawning and summer dry seasons (March 15 to July 15), backcountry permits will be limited to areas east of SR 85 and south of North Puerto Blanco Drive. These efforts should effectively minimize disturbance of pronghorn from visitors during the fawning and summer dry seasons, and offset curtailment of pronghorn range through public use of Organ Pipe Cactus NM.

#### Direct Mortality or Injury

Direct mortality or injury of Sonoran pronghorn from the proposed action is possible, but unlikely. Vehicular strikes are possible on SR 85. As vehicular traffic on all roads increases, the possibility of injury or mortality to pronghorns also increases. A vehicle strike could occur on the unpaved roads, although there are no documented occurrences of pronghorn mortality from vehicles anywhere in Organ Pipe Cactus NM, including SR 85, nor on unpaved roads elsewhere within the range of the pronghorn.

Other proposed actions have beneficial effects by reducing the potential for mortality. The NPS Law Enforcement patrols aid in reducing foot and vehicle traffic associated with undocumented aliens and smuggling, and minimize the likelihood of poaching within Organ Pipe Cactus NM. Backfilling abandoned mining features help to prevent wildlife pitfalls.

#### Disease

Potential diseases spread from livestock include epizootic hemorrhagic disease, bluetongue, leptospirosis, and possibly other diseases (Table 5). Organ Pipe Cactus NM's program for excluding domestic livestock reduces the potential for transmittal of livestock diseases. Recreational use of horses is allowable in the backcountry. However, this recreational activity rarely takes place and is therefore unlikely to result in an adverse impact by introducing the possibility of disease transmission.

### **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Relatively small parcels of private and State lands occur within the currently occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from the Mohawk Mountains to near Tacna. State inholdings in the BMGR were recently acquired by the USAF. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other

activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and along the Mexican border and the effects of these activities are expected to continue into the foreseeable future. Historical habitat and potential recovery areas currently outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, and Yuma.

Of particular concern are increasing illegal border crossings by undocumented migrants and smugglers. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000. In 2001, estimates of undocumented migrants traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001). Increased presence of Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and BMGR (Klein 2000). Illegal activities result in habitat damage in the form of new roads, discarded trash, cutting of firewood, illegal campfires and increased chance of wildfire (NPS 2001), and likely result in disturbance of pronghorn. These activities are expected to continue into the future and may continue to increase unless changes in U.S. immigration policy occur.

## CONCLUSION

After reviewing the current status of the Sonoran pronghorn, the environmental baseline for the action area, the effects of the proposed and ongoing NPS action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonoran pronghorn. No critical habitat has been designated for this species, therefore, none will be affected. In making our determination, we considered the following:

NPS has proposed conservation measures that significantly reduce the effects of the proposed action on the Sonoran pronghorn by (1) eliminating or reducing the effects of disturbance during the fawning and summer dry seasons by instituting seasonal closures of key roads and backcountry areas; (2) implementing a monitoring program for the species to locate animals within Organ Pipe Cactus NM and then targeting these occupied areas for additional recreational closures; (3) limiting future development to the area south of North Puerto Blanco Drive and east of Senita Basin Road and limiting timing of construction to occur outside the pronghorn fawning and summer dry seasons; (4) establishing a 3-year experimental pronghorn crossing zone on SR 85 with seasonal speed limit reductions, including a monitoring program to assess effectiveness; (5) working with BLM to reduce the barrier effects of the shared fence between BLM and Organ Pipe Cactus NM; and (6) cooperating with Border Patrol to limit traffic by undocumented aliens and smugglers.

Our conclusion that the proposed action is not likely to jeopardize the continued existence of the Sonoran pronghorn is based on our analysis of the status of the pronghorn rangewide, the environmental baseline, the effects of the proposed action, and the cumulative effects. To summarize from the "Status of the Species", the status of the pronghorn rangewide is poor, with sub-populations in the Pinacate Region of Sonoran and in the United States being most threatened. Fragmentation of populations, loss of historical habitats, disease, and human-caused degradation of remaining habitats and disturbance of pronghorn are the most important causes of poor rangewide status. As discussed in the "Environmental Baseline", within the action area, we believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors, including habitat degradation and disturbance within the pronghorn's current range resulting from a myriad of human activities and disease exposure from those activities, combined with periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the U.S. The proximate cause of the dramatic decline of the U.S. sub-population of pronghorn during 2000-2002 is drought, but the decline was undoubtedly exacerbated by the human-induced degradation of their habitat and human-created

barriers, which restrict their movement. Cumulative effects, particularly illegal crossings of the border and travel through pronghorn habitat by smugglers and undocumented immigrants, add additional significant stressors to pronghorn populations.

At the current time, the Sonoran pronghorn population is declining. However, the high fawn to doe ratio experienced in 2001 when rainfall was abundant and timed well for forage production provides evidence of the reversible nature of the current decline. NPS will substantially mitigate its contribution to future declines of the pronghorn through prompt and full implementation of their conservation measures. NPS can do nothing to mitigate for the decline of the pronghorn caused by drought, barriers such as Interstate 8 and the U.S. border fence, and other factors outside of NPS control. Thus, although the status of the pronghorn is clearly perilous, the effects of the proposed action, which include effects of conservation measures, do not significantly contribute to this perilous status. When added to the environmental baseline, the status of the species, and cumulative effects, the effects of NPS's proposed action, which includes significant new conservation measures, do not reduce appreciably the likelihood of survival and recovery of the subspecies in the wild. Therefore, the continuing NPS action, with modifications and conservation measures, will not jeopardize the continued existence of the subspecies. As proposed, NPS actions do not significantly adversely affect important fawn recruitment or significantly adversely affect occupied pronghorn habitat. Concerns about habitat deterioration, forage conditions, barriers to movement, and disease are minimized by NPS's conservation measures. In determining that the proposed action is not likely to jeopardize the continued existence of the pronghorn, we assume that the conservation measures will be implemented fully and promptly.

## **INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the provided that such taking is in compliance with the terms and conditions of this incidental take statement.

### **Amount or Extent of Take Anticipated**

With implementation of the proposed action with the conservation measures, we do not anticipate take of Sonoran pronghorn as a result of the proposed action.

## **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementing the following actions:

1. Continue to fund and support basic research, inventory, and monitoring of the Sonoran pronghorn.

NPS should fund or staff recovery projects in Appendix 1.

2. Explore additional methods of ameliorating the barrier effects of SR 85, such as establishing a lower speed limit on SR 85 and investigating the feasibility of installation of underpasses on SR 85.
3. NPS should hire a full-time recovery projects coordinator for listed species at Organ Pipe Cactus NM. This coordinator could seek funding and facilitate implementation of proposed conservation measures for the pronghorn, pygmy-owl, and other species; and serve as the Monument's contact for cooperative projects and coordination throughout the ranges of listed species occurring at the Monument.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

### **CACTUS FERRUGINOUS PYGMY-OWL (*Glaucidium brasilianum cactorum*)**

#### **STATUS OF THE SPECIES**

A detailed description of the life history and ecology of the cactus ferruginous pygmy-owl (pygmy-owl) can be found in the *Birds of North America* (Proudfoot and Johnson 2000), *Ecology and Conservation of the Cactus Ferruginous Pygmy-owl in Arizona* (Cartron and Finch 2000), and in other information available from the Arizona Ecological Services Field Office ([arizonaes.fws.gov](http://arizonaes.fws.gov)). Information specific to the pygmy-owl in Arizona is preliminary. Research completed in Texas has provided useful insights into the ecology of this subspecies and, in some instances, represents the best available scientific information. However, habitat and environmental conditions are somewhat different than in Arizona and conclusions based on Texas information should be extrapolated to Arizona with caution.

#### **A. Species Description, Listing, and Recovery Planning**

The pygmy-owl is in the order Strigiformes and the family Strigidae. They are small birds of prey, averaging 6.75 inches in length. Males average 2.2 ounces with females are slightly larger averaging 2.6 ounces. The pygmy-owl is reddish brown overall, with a cream-colored belly streaked with reddish brown. The crown is lightly streaked and a pair of dark brown/black spots outlined in white occur on the nape suggesting "eyes." The species lacks ear tufts and the eyes are yellow. The tail is relatively long for an owl and is reddish brown in color with darker brown bars. Pygmy-owls have large feet and talons relative to their size.

The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997 (U.S. Fish and Wildlife Service 1997 [62 FR 10730]) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999 (U.S. Fish and Wildlife Service 1999 [64 FR 37419]) in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona. However, on September 21, 2001, the U.S. District Court for the District of Arizona vacated this final rule designating critical habitat for the pygmy-owl, and remanded its designation back to us for further consideration. On November 27, 2002, we proposed 1,208,001 acres of critical habitat in Pima and Pinal counties in Arizona (U.S. Fish and Wildlife Service 2002).

In September 1998, we appointed the Cactus Ferruginous Pygmy-Owl Recovery Team. The Team is comprised of a Technical Group of biologists (pygmy-owl experts and raptor ecologists) and an Implementation Group which includes representatives from affected and interested parties (i.e., Federal

and State agencies, local governments, the Tohono O'odham Nation, and private groups). A draft recovery plan was released in January 2003 (U.S. Fish and Wildlife Service 2003).

## **B. Distribution and Status**

The cactus ferruginous pygmy-owl is one of four subspecies of ferruginous pygmy-owl. Cactus ferruginous pygmy-owls are known to occur from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. It is unclear at this time if the ranges of the eastern and western populations of the ferruginous pygmy-owl merge in southern Mexico. Recent genetic studies suggest that ferruginous pygmy-owl populations in southern Arizona and southern Texas are distinct subspecies, and that there is no genetic isolation between populations in the United States and those immediately south of the border in northwestern or northeastern Mexico (Proudfoot and Slack 2001). Results also indicate a comparatively low haplotypic diversity in the northwestern Tucson population, suggesting that it may be recently separated from those in the Altar Valley, Arizona, and in Sonora and Sinaloa, Mexico.

We are currently funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the pygmy-owl there. The results of the first systematic surveys for pygmy-owls in Sonora, conducted in 2000, resulted in 279 confirmed detections and additional 22 possible detections (Flesch and Steidl 2000). Pygmy-owls were detected throughout the state of Sonora, from the international border south to Presa Alvaro Obregon, 19 miles from Ciudad Obregon. Twenty-six pygmy-owls were detected within six miles of the Arizona border (Flesch and Steidl 2000). Preliminary results for the 2001 surveys were similar. Further studies are needed to determine their distribution elsewhere in Mexico.

Given the new information about the status of the pygmy-owl in Mexico, there appears to be potential for movement of pygmy-owls across the international border, but the extent of this interaction remains unknown at this time. Information about the status of pygmy-owls on either side of the international border suggests that fewer pygmy-owls occur on the U.S. side of the border than one would expect. Clearly, maintaining connectivity between populations in the U.S. populations and Mexico will be critical in recovery of the pygmy-owl (U.S. Fish and Wildlife Service 2003).

The range of the Arizona DPS of the pygmy-owl extends from the International Border with Mexico north to central Arizona. The northernmost historical record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, prior to the mid-1900s, the pygmy-owl was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (AGFD unpubl. data, Hunter 1988).

The majority of Arizona pygmy-owl detections in the last seven years have been from the northwestern Tucson area in Pima County. Pygmy-owls have also been detected in southern Pinal County, at the Monument, Cabeza Prieta NWR, Buenos Aires National Wildlife Refuge (BANWR), and on the Coronado National Forest. The results of surveys from 1997 to the present indicate both an increase in our knowledge of pygmy-owl distribution result from increasing survey efforts over time, and recently what also appears to be a declining trend in numbers of pygmy-owls. In 1997, we knew of five pygmy-owls in the Tucson Basin and two adult males at Organ Pipe Cactus NM. In 1998, 35 pygmy-

owls were confirmed. In 1999, a total of 41 adult pygmy-owls were found in Arizona at 28 sites. Surveys conducted in 2000 resulted in 34 adult pygmy-owls confirmed at 24 sites. Surveys conducted during the 2001 season resulted in a total of 47 adult pygmy-owls confirmed at 29 sites, including 17 nests, in Arizona. A 50 percent fledgling mortality occurred in 1999-2001, and no more than 12 owls were known to have successfully dispersed from natal areas in any one year. During 2002 surveys, only 18 adult pygmy-owls from 14 sites were confirmed. As with the pronghorn, the 2002 drought had severe impacts to pygmy-owl productivity. In comparison with 2001 when 17 nests were confirmed, only 3 nests were observed in 2002 (an 82 percent decline in nesting). From these 3 nests, 9 young were produced, all of which died.

### C. Life History

Pygmy-owls are considered non-migratory throughout their range. There are winter (November through January) pygmy-owl location records from throughout its range in southern Arizona (R. Johnson unpubl. data 1976, 1980; University of Arizona 1995, Tibbitts, pers. comm. 1997, Abbate *et al.* 1999, 2000, U.S. Forest Service, unpubl. data). These winter records suggest that pygmy-owls do not migrate southward to warmer climates during the winter months.

The pygmy-owl is primarily diurnal (active during daylight) with crepuscular (active at dawn and dusk) tendencies. They can be heard making a long, monotonous series of short, repetitive notes, mostly during the courtship and nesting season which runs from February through July. Male pygmy-owls establish territories using territorial-advertisement calls to repel neighboring males and attract females. In Arizona, noticeable spontaneous calling begins in February, peaks from March-April, and tapers off by early June. Peak calling occurs from April-May in Texas, with incline and descent similar to Arizona birds. In Texas, spontaneous calling is infrequent from July through March; however, responses to broadcasted conspecific calls during this period were not reduced (Proudfoot and Beasom 1996). Pygmy-owls are most vocal and responsive during the courtship and nesting period (February through June above in this paragraph it says Feb-July). However, calling and defensive behavior is also manifest in nesting territories from fledging to dispersal (June through August).

Usually, pygmy-owls nest as yearlings (Abbate *et al.* 1999, Grymek 1972), and both sexes breed annually thereafter. Territories normally contain several potential nest-roost cavities from which responding females select a nest. Hence, cavities/acre may be a fundamental criteria for habitat selection. Historically, pygmy-owls in Arizona used cavities in cottonwood, mesquite, and ash trees, and saguaro cacti for nest sites (Millsap and Johnson 1988). Most nests in recent years have been in saguaros.

Pygmy-owls exhibit a high degree of site fidelity once territories (the area defended) and home ranges (the area used throughout the year) have been established (AGFD unpubl. data). Because of strong site fidelity, pygmy-owls are more likely to be affected by projects within their home range. Behaviorally, the option to seek alternative areas outside of the home range appears limited, particularly for males.

Data on the size of areas used by pygmy-owls on an annual basis in Arizona are limited. Until more complete information is available from Arizona, the home range size estimate we are using is based on telemetry work completed in Texas. In Texas, Proudfoot (1996) noted that, while pygmy-owls used between 3 and 57 acres during the incubation period, they defend up to 279 acres in the winter. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 - 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot unpubl. data). Therefore, a 280 acre home range is considered necessary for pygmy-owls to meet their life history requirements on an annual basis.

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators include great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech-owls (*Otus kennicottii*), and domestic cats (*Felis catus*) (Abbate *et al.* 2000, AGFD unpubl. data). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000).

Pygmy-owls typically hunt from perches in trees with dense foliage using a perch-and-wait strategy. Their diverse diet includes birds, lizards, insects, and small mammals (Bendire 1888, Sutton 1951, Sprunt 1955, Earhart and Johnson 1970, Oberholser 1974, Proudfoot 1996, Abbate *et al.* 1996, 1999). Free-standing water does not appear to be necessary for the survival of pygmy-owls. It is likely that pygmy-owls meet much of their biological water requirements through the prey they consume. However, the presence of water may provide related benefits to pygmy-owls.

Additional life history information can be found on the Arizona Ecological Services website ([arizonaes.fws.gov](http://arizonaes.fws.gov)), in the draft recovery plan (U.S. Fish and Wildlife Service 2003), in published listing and critical habitat documents (U.S. Fish and Wildlife Service 1997, 1999, 2002), and in Abbate *et al.* (1999, 2000), Cartron and Finch (2000) and in Proudfoot and Johnson (2000).

#### **D. Threats**

The draft pygmy-owl recovery plan (U.S. Fish and Wildlife Service 2003) identified six reasons for decline of the pygmy-owl, that without management action, may negatively affect pygmy-owl recovery in Arizona and continue to contribute to their decline. These factors include: (1) habitat destruction and degradation; (2) human activity and mortality; (3) predation; (4) disease; (5) genetic stochasticity; and (6) fires.

Of the factors listed above, perhaps the most important in the decline of the pygmy-owl are loss and fragmentation of habitat (Oberholser 1974, Johnsgard 1988, Millsap and Johnson 1988, Wauer *et al.* 1993, Tewes 1995). Early (Bendire 1892, Fisher 1893, Gilman 1909, Swarth 1914, Griscom and Crosby 1926, Friedmann *et al.* 1950) and more recent (Falls 1973, Davis and Russell 1979, 1984 and 1990) information suggest that indirect correlations exist between the decline in abundance of pygmy-owls and urban and agricultural expansion, such as that occurring in many portions of southern Arizona. Johnson *et al.* (1979) suggested that the destruction of riparian woodlands played a significant role in the decline of pygmy-owls in Arizona. It is estimated that between 85 and 90 percent of riparian woodlands in the southwestern U.S. have been lost or modified from a variety of land-use practices (e.g., Phillips *et al.* 1964, Carothers 1977, Kusler 1985, Jahrsdoerfer and Leslie 1988, U.S. Fish and Wildlife Service 1988, U.S. GAO 1988, Szaro 1989, Dahl 1990, State of Arizona 1990, Bahre 1991). Historically, and in recent decades, the loss of these habitats have impacted the pygmy-owl. Today, loss and fragmentation of upland and xeroriparian Sonoran Desert scrub and semidesert grassland vegetation from large scale residential and commercial developments continue to threaten the pygmy-owl.

Human-caused mortalities, both direct and indirect (e.g. collisions with cars, glass windows, fences, power lines, domestic cats, etc.) are beginning to be documented in Arizona (Abbate *et al.* 1999, AGFD unpubl. data) and may be underestimated. Human activities near nests at critical periods of the nesting cycle may cause pygmy-owls to abandon their nests sites, whereas activities during other periods could affect dispersal and foraging (U.S. Fish and Wildlife Service 2003).

Other potential threats include disease, genetic stochasticity, and fires (U.S. Fish and Wildlife Service



2003). Additional information on pygmy-owl distribution, status, and threats can be found on the Arizona Ecological Services website ([arizonaes.fws.gov](http://arizonaes.fws.gov)), in the draft recovery plan (U.S. Fish and Wildlife Service 2003), in published listing and critical habitat documents (U.S. Fish and Wildlife Service 1997, 1999, 2002), and in Abbate *et al.* (1999, 2000), Cartron and Finch (2000) and in Proudfoot and Johnson (2000).

### *Federal Projects Resulting in Incidental Take*

To date, we have anticipated incidental take of pygmy-owls in only 5 instances: (1) Thornydale Road improvement project in Pima County, Arizona (consultation number 2-21-00-F-213, February 2002); (2) Dove Mountain Development in Marana, Arizona (consultation number 2-21-99-F-363, October 2000); (3) Issuance of an Endangered Species Act section 10(a)(1)(B) permit for the Lazy K Bar Ranch in association with a Habitat Conservation Plan (HCP) (consultation number 2-21-98-F-334, November 1998); (4) the Tucson Safford BLM Office Grazing Program in southern Arizona (consultation number 2-21-96-F-0160, September 1997); and (5) the Organ Pipe Cactus NM GMP (consultation number 2-21-89-F-078, June 26, 1997). In order to provide a complete account of the current status of the pygmy-owl in Arizona, we describe these actions in detail below.

#### Thornydale Road Improvement Project

The proposed action for the Thornydale Road improvement project involved the issuance of a National Pollutant Discharge Elimination System (NPDES) general permit under section 402 of the Clean Water Act (CWA) from the EPA and a section 404 permit under the CWA from the Army Corps of Engineers (COE). The EPA was the lead Federal agency for this consultation. These permits allowed the widening and placement of flood control structures along Thornydale, Magee, and Cortaro Farms roads in Pima County, Arizona. Because of the inclusion of significant conservation measures, we did not anticipate the proposed action would incidentally cause any take in the form of harm, death, or injury of any pygmy-owl. The project site was, however, within a portion of a resident male pygmy-owl's home range. It was therefore believed possible that non-lethal incidental take (in the form of harassment only) of this pygmy-owl may occur as the result of ongoing construction activity.

The biological opinion presented four reasonable and prudent measures for reducing incidental take, which included: (1) minimize vegetation disturbance, loss of key habitat components, and other potential adverse effects to pygmy-owls within the estimated home range of the resident single or pygmy-owl pair; (2) minimize noise disturbance immediately adjacent to a pygmy-owl nest or activity center; (3) promote connectivity to allow for movement within pygmy-owl home ranges, between pygmy-owl sites and adjacent suitable habitat within the project site and Conservation Lands; and (4) monitor construction activities during and after completion of the project to ensure compliance with terms and conditions and to determine their effectiveness to accomplish their stated goals.

#### Dove Mountain Development

The proposed action for this consultation also involved the issuance of a NPDES general permit under section 402 of the CWA from the EPA and a section 404 permit under the CWA from the COE, with the EPA acting as the lead federal agency. These permits facilitated development within an approximately 5,924-acre residential and commercial development with parks and open space, located in Marana, Arizona.

We did not anticipate the proposed action would incidentally cause any take in the form of harm, death, or injury of a pygmy-owl. Further, there were no currently known nesting or resident pygmy-owl sites or portions of their home range within the project site. However, because nesting owls were nearby, we anticipated that, for a 20-30 year phased development project, it was reasonably certain

that pygmy-owls would move onto or into the immediate vicinity of the project site and establish a nest or activity center. Therefore, it was anticipated that non-lethal incidental take (in the form of harassment only) of a pair or resident single pygmy-owl may occur if a pygmy-owl establishes a territory within 0.37 mile of ongoing development activity.

We provided the following reasonable and prudent measures in order to minimize take: (1) minimize vegetation disturbance, loss of key habitat components, and other potential adverse effects to pygmy-owls which are first detected prior to commencement of clearing vegetation for a construction phase within the estimated home range of a pair or resident single pygmy-owl; a (2) minimize noise disturbance immediately adjacent to a pygmy-owl nest or activity center which is first detected prior to the commencement of clearing vegetation for a construction phase; (3) minimize vegetation disturbance, loss of key habitat components, and other potential adverse effects to pygmy-owls which are first detected after commencement of clearing vegetation for a construction phase within the estimated home range of a pair or resident single pygmy-owl; (4) minimize noise disturbance immediately adjacent to a pygmy-owl nest or activity center which is first detected after commencement of vegetation clearing for a construction phase; (5) promote connectivity to allow for movement within pygmy-owl home ranges, between pygmy-owl sites and adjacent suitable habitat, in Conservation Lands, and Open Space areas; and (6) monitor development activities within the home range of a new pygmy-owl, and conservation measures, to ensure compliance with terms and conditions.

#### Lazy K Bar Ranch HCP

The proposed action was the issuance of an Endangered Species Act section 10(a)(1)(B) permit for the Lazy K Bar Ranch in association with a HCP. The project included the operation of a resort/guest ranch and ultimately its conversion into a low-density, residential area. The consultation covered both the transitional and residential phases of the project. We concluded that take, in the form of harassment due to habitat loss and noise disturbance, may result in up to two pygmy-owls and their young. We provided the following reasonable and prudent measures: (1) minimize the removal of suitable habitat areas associated with project development; (2) avoid disturbance of breeding pygmy-owls and loss of nest trees or saguaros while being used by pygmy-owls; (3) minimize habitat disturbance and loss of key habitat components during project development; and 4) monitor the effects of the proposed project on habitat quality over time, and ensure adherence to HCP criteria.

#### Safford and Tucson Livestock Grazing Program

The proposed action for this project was the issuance of permits to graze livestock on the Safford and Tucson districts of the BLM, the lead Federal agency for the consultation. This is a large programmatic consultation covering many allotments (over 250) that has been amended several times since the original opinion was issued in 1997. The most recent amendment to address the pygmy-owl was amendment four, which also addressed newly designated critical habitat. As mentioned above, pygmy-owl has since been remanded to us by the district court and was proposed in November 2002.

We found, given the documentation of nesting pygmy-owls and good habitat on the Guild Wash and Owl Head allotments, and presence of a pygmy-owl nest within three miles of BLM lands on the Cross Triangle allotment, that take of pygmy-owls is reasonable likely to occur over the life of the proposed action (BLM grazing leases can be of any length of time, but cannot exceed ten years). We anticipated that up to one nesting pair of pygmy-owls and one unpaired pygmy-owl could be harmed due to: (1) construction of range improvement projects (corrals, fences, pipelines, tanks, etc.) or implementation of mechanical or chemical vegetation treatments, or prescribed fire that destroys nesting or foraging habitat; and (2) planting or seeding of non-native plants that may alter fire regimes and increase the chance that a wildfire would occur in occupied pygmy-owl habitat.

We provided the following reasonable and prudent measures in order to minimize take: (1) Actions shall be taken to minimize direct effects of cattle grazing on those habitats that, based on current

knowledge, have the greatest potential to support pygmy-owls, (2) Activities that may result in a take of cactus ferruginous pygmy-owl or destruction of pygmy-owl habitat shall be evaluated, monitored, and modified as needed to reduce potential adverse effects to the pygmy-owl, (3) monitor incidental take resulting from the proposed action and report to the FWS the findings of that monitoring.

### Organ Pipe Cactus NM GMP

We issued our biological opinion on the GMP on June 26, 1997. The biological opinion provides a history of the consultation that occurred between April 4, 1989, and the issuance of the biological opinion, and is hereby incorporated by reference. The opinion found that the effects of the action were not likely to jeopardize the continued existence of the Sonoran pronghorn, lesser long-nosed bat, or cactus ferruginous pygmy-owl. Additional information regarding the incidental take statement and other details for the pronghorn are found in the Environmental Baseline. In regard to the pygmy-owl, we anticipated take of 15 pygmy-owls in the form of harassment of individuals nesting or foraging in the area during the life of the project (15 years). The opinion contained four reasonable and prudent measures to minimize take of the pygmy-owl: (1) conduct a feasibility study to evaluate the effects of human presence on pygmy-owls in the Alamo Canyon campground, (2) establish closure areas on a case-by-case basis where pygmy-owls are detected along trails or other visited sites, (3) develop and implement interpretive media to elicit increased awareness of the vulnerability of pygmy-owls on the Monument in the event that pygmy-owl localities become common knowledge to the public and are being harassed, (4) monitor the effects of human visitation to Alamo Canyon Wash on pygmy-owls for the life of the project.

## **ENVIRONMENTAL BASELINE**

### **A. Action Area**

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). We have determined that the action area for the pygmy-owl is Organ Pipe Cactus NM and adjacent lands within 22 miles of its borders. We base this determination on the maximum dispersal distance of juvenile pygmy-owls from nests in Texas and Arizona (Proudfoot unpubl. data, AGFD unpubl. data). As delineated, the action area includes portions of the Cabeza Prieta NWR, BLM lands, and lands on the Tohono O'odham Nation and in Mexico.

### **B. Terrain, Vegetation Communities, and Climate in the Action Area**

A complete description of Organ Pipe Cactus NM and surrounding areas has been previously provided (see "Environmental Baseline, part B. Terrain, Vegetation Communities, and Climate in the Action Area" for the Sonoran pronghorn).

### **C. Status of the Cactus Ferruginous Pygmy-Owl in the Action Area**

Pygmy-owl habitat in Organ Pipe Cactus NM is of moderate to above-average quality. The area offers relatively dense and diverse upper bajada Sonoran Desert scrub, with a number of larger xeroriparian areas, and numerous smaller washes, including wash confluence areas. The action area encompasses all of pygmy-owl proposed critical habitat unit 5, and pygmy-owl recovery area 8 (U.S. Fish and Wildlife Service 2002, 2003). The purpose of critical habitat unit 5 is to protect and maintain known breeding areas, provide connectivity to Mexico and the Tohono O'odham Nation, and allow for expansion of this sub-population through dispersal. The primary purposes of recovery area 8 are to protect existing pygmy-owl sites and breeding habitat, and to serve as link to habitat and breeding pygmy-owls in Mexico. Pygmy-owl presence at Organ Pipe Cactus NM has been surveyed since

1977, when two pairs were recorded. In 1982, one pair of pygmy-owls was found followed by two pairs in 1992. Through limited surveys, approximately 3 to 5 pygmy-owl territories have been located and monitored since 1995. Four pairs of pygmy-owls were located in 1999 and 4 pairs and 2 individuals were discovered in 2000. Surveys in 2001 detected 5 occupied territories, including 3 confirmed pairs with an additional pair strongly suspected. In contrast, during 2002 birds were detected at several locations early in the season, but as drought effects became more pronounced over the course of the year, owls became very difficult to detect. In 2002, owls were sporadically detected at 4 sites, only one pair was detected, and no nests were confirmed or suspected (NPS 2002). As of April 2003, pygmy-owls had been found at 3 sites, and were tentatively identified at a fourth site. No paired owls or nests had been found.

Construction and development projects in Organ Pipe Cactus NM have impacted the pygmy-owl and its habitat. Most of the construction and development is related to maintaining, improving, and/or expanding facilities used for management of and providing services to the visiting public. The majority of these actions center on the Twin Peaks area (Visitor Center, residence area, maintenance area, and campground) and have taken place in or adjacent to pygmy-owl habitat and territories. Furthermore, additional maintenance and upgrading projects are planned. Although a number of section 7 consultations regarding potential impacts to pygmy-owls have been conducted within the action area, only the original GMP opinion anticipated incidental take would result from these actions. The 1997 GMP biological opinion anticipated take of 15 owls in the form of harassment, as described above.

On BLM lands, only the Cameron and Childs grazing allotments contain suitable pygmy-owl habitat. The Coyote Flat and Why allotments do not contain suitable or potential pygmy-owl habitat. According to the BLM, these allotments do not have the capability to produce potential or suitable habitat in the future because the washes are too small to support dense vegetation patches >3 acres in size. On the Cameron Allotment, a single pygmy-owl was detected at the Cuerda de Lena Wash in 1998. Surveys conducted by BLM contract during 2001 also detected a single pygmy-owl along Sikort Chuapo Wash on the Childs Allotment. The initial detection was followed up by Tim Tibbitts (Organ Pipe Cactus NM), who stated that although the response call was somewhat atypical for a pygmy-owl, he was reasonably certain of his determination. For this reason, BLM states that this observation was only 70 percent confirmed. Due to the nature of the habitat, its proximity to other pygmy-owl locations, and the high degree of confidence in the determination, we treat this observation as a confirmed sighting. No pygmy-owls were documented on the five BLM allotments in the Ajo area during 2002 surveys. No survey data exist yet for 2003 for BLM lands. While there are no confirmed current records for pygmy-owl on BMGR, the Range overlaps the pygmy-owl's historical distribution and contains potentially suitable habitat (Dames and Moore 1995). In 2001, 2 new pygmy-owl sites were documented for Cabeza Prieta NWR, near Papago Well, which is within the action area. We have no information about pygmy-owl occurrence on the Tohono O'odham Nation or in Mexico within the action area.

Although owls have been detected on all federal lands contiguous to Organ Pipe Cactus NM, only Organ Pipe Cactus NM is known to have had nesting pygmy-owls consistently. Pygmy-owl locations in areas surrounding Organ Pipe Cactus NM may represent individuals dispersing into adjacent areas. Recent information has shown pygmy-owls to be more numerous adjacent to and near the Arizona border in Mexico (Flesch and Steidl 2000). There also exists considerable unsurveyed habitat on the Tohono O'odham Nation, and, although we have no means of quantifying this habitat, the distribution of recent sightings on non-Tribal areas east, west, and south of the U.S. portion of the Tohono O'odham Nation lead us to reasonably conclude that these Tribal lands may support meaningful numbers of pygmy-owls. Consequently, we believe that it is highly likely that the overall pygmy-owl population in Arizona is maintained by the movement and dispersal of owls among groups of pygmy-owls in southern Arizona and northern Mexico resulting from the connectivity of suitable habitat. Thus, Organ Pipe Cactus NM may represent an important source population for surrounding areas, as well as a dispersal corridor for pygmy-owls moving into the U.S. from Mexico.

#### D. Proposed Critical Habitat

On November 27, 2002, we proposed 1,208,001 acres of critical habitat in Pima and Pinal counties in Arizona (U.S. Fish and Wildlife Service 2002). All of critical habitat unit 5 is encompassed by the action area. Critical habitat unit 5 runs from the Mexican border northward along the western edge of the Tohono O'odham Nation and is almost entirely under Federal ownership, including portions of Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument, and contiguous BLM land in the vicinity of the town of Ajo. This unit also contains a small amount of State Trust land. The area consists of Arizona upland Sonoran Desert scrub and lower Colorado River Sonoran Desert scrub. Recreation-related activities, undocumented alien traffic and management, and grazing on BLM lands are the primary management issues in this unit. Critical habitat unit 5 contains numerous pygmy-owl locations, including breeding sites. Since 1999, this critical habitat unit has accounted for approximately 21 percent of the known pygmy-owls in Arizona (Abbate *et al.* 1999, 2000; AGFD unpubl. data). We determined that this critical habitat unit is essential to pygmy-owl conservation, as it provides breeding habitat contiguous with known pygmy-owls in Mexico and likely on the Tohono O'odham Nation. The purpose of this critical habitat unit is to protect and maintain known breeding areas, provide connectivity to Mexico and the Tohono O'odham Nation, and allow for expansion of this sub-population through dispersal. Recruitment and resulting expansion of the population in this area are necessary for the conservation of the species.

Critical habitat unit 5 contains all of the primary constituent elements. In the critical habitat proposal, we describe those physical and biological features that are essential to the conservation of the pygmy-owl. These are briefly summarized below in relation to critical habitat unit 5. See the critical habitat rule for a more thorough discussion (U.S. Fish and Wildlife Service 2002).

The first primary constituent element provides the general biotic communities which are known to support pygmy-owl habitat in Arizona. We concluded that this element is essential to the conservation of the pygmy-owl because the species is not known to occur outside of these biotic communities. We included communities that pygmy-owls occurred in historically and currently. In critical habitat unit 5, and in the action area, this consists primarily of Sonoran Desert, particularly Sonoran Desert scrub, primarily below 4,000 feet elevation. The uplands of these areas are used by pygmy-owls, but the xeroriparian areas (desert washes) appear to be especially important. Sonoran Desert scrub communities are characterized by the presence of a variety of cacti, large trees, shrubs, and a diversity of plant species. This community includes, but is not limited to, palo verde (*Parkinsonia* spp.), ironwood (*Olneya tesota*), mesquite, acacia (*Acacia* spp.), bursage (*Ambrosia* spp.), desert hackberry (*Celtis pallida*), gray thorn (*Zizyphus obtusifolia*), and columnar cacti such as organ pipe (Gilman 1909, Bent 1938, van Rossem 1945, Phillips *et al.* 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnson-Duncan *et al.* 1988, Johnsgard 1988, Millsap and Johnson 1988). Xeroriparian drainages in Sonoran Desert scrub are used extensively by pygmy-owls for nesting and dispersal (Wilcox *et al.* 2000). Drainages concentrate available moisture influencing the diversity and structure of the vegetation, and although they are characterized by the same species in the uplands, these species typically grow bigger and occur in higher densities within the drainages.

The second primary constituent element provides the components necessary for nesting, such as cavity availability and cover. Nesting cavities are located in trees, and within the action area/critical habitat unit 5 these are most likely to include mesquite, palo verde, ironwood and hackberry with a trunk diameter of 6 inches or greater measured 4.5 feet from the ground, or large columnar cacti such as saguaro or organ pipe larger than 8 feet in height. All but 2 nests found in recent years in Arizona were located in saguaro cacti (Abbate *et al.* 1996, 1999, 2000, AGFD unpubl. data).

The third primary constituent element consists of the structural makeup of habitat necessary to meet the biological needs of the pygmy-owl; such as breeding, nesting, roosting, perching, foraging, predator avoidance, and thermal cover, and also promotes prey diversity and availability. Multilayered vegetation (presence of canopy, midstory, and ground cover) provided by trees and cacti in association with shrubs and cacti such as acacia, prickly pear, desert hackberry, graythorn, etc., and ground cover such as triangle-leaf bursage, burrow weed, grasses, or annual plants. Data gathered by AGFD indicates 35 and 48 percent ground cover at perch sites and nest sites, respectively; and 73 percent and 87 percent canopy cover at perch sites and nest sites, respectively, characterize vegetation communities used by pygmy-owl (Wilcox *et al.* 1999). These cover percentages are based on a small sample size, and were developed using methods to describe microhabitat characteristics, and so may have only limited applicability in project evaluation.

Pygmy-owls typically hunt from perches in trees with dense foliage using a perch-and-wait strategy; therefore, sufficient cover must be present within their home range for them to successfully hunt and survive. Pygmy-owls also hunt by inspecting tree and saguaro cavities for other nesting birds, and possibly bats. Their diverse diet includes birds, lizards, insects, and small mammals (Bendire 1888; Sutton 1951; Sprunt 1955; Earhart and Johnson 1970; Oberholser 1974; Proudfoot 1996; Abbate *et al.* 1996, 1999). The density of annual plants and grasses, as well as shrubs, may be important to enhancing the pygmy-owl's prey base. Vegetation communities which provide a diversity of structural layers and plant species likely contribute to the availability of prey for pygmy-owls (Wilcox *et al.* 2000). Conservation of the pygmy-owl should include consideration of the habitat needs of prey species, including structural and species diversity and seasonal availability. Pygmy-owl habitat must provide sufficient prey base and cover from which to hunt in an appropriate configuration and proximity to nest and roost sites.

Primary constituent element 4 consists of vegetation providing mid-story and canopy level cover. This is provided primarily by trees greater than 6 feet in height in a configuration and density compatible with pygmy-owl flight and dispersal behaviors. Based on AGFD data, within 50-foot radius plots centered on nests and perch sites, the mean number of trees per plot in Sonoran Desert scrub plots was 12.5 with a mean height of 13 feet. These data are based on a small sample size and were developed using methods to describe microhabitat characteristics, therefore they may have only limited applicability in project evaluation. Cover and structural diversity of habitat are necessary for small scale movements associated with successful pygmy-owl breeding, foraging and nesting, as well as for longer movements associated with dispersal. Pygmy-owl dispersal patterns are just beginning to be documented. Dispersal of juvenile pygmy-owls from nests in Arizona have averaged 3.6 to 6.2 miles (Abbate *et al.* 1999, 2000). The maximum documented juvenile dispersal distance from nests is 34.8 km (21.8 mi) (AGFD unpubl. data). Juveniles typically disperse from natal areas in July and August and do not appear to defend a territory until September. They appear to fly from tree to tree instead of long flights and may move up to a mile or more in a night (Abbate *et al.* 1999). Trees of appropriate size and spacing appear to be necessary for successful dispersal, but specific data describing this pattern are currently unavailable. Pygmy-owls have rarely been observed using areas of high human activity, such as high-density (4-5 houses/ac) housing, for normal day-to-day activities within a home range, nor during dispersal (AGFD unpubl. data). Successful dispersal and gene flow is dependent on habitats in an appropriate configuration that are protected from disturbance.

Primary constituent element 5 consists of habitat elements configured, and human activity levels minimized so that unimpeded habitat use, based on pygmy-owl behavioral patterns (typical flight distances, activity level tolerance, etc.) can occur during dispersal and within home ranges (the total area used by an owl). Certain landscape level conditions may affect pygmy-owl behavioral patterns and relate to the need to protect habitats from various disturbances. Pygmy-owl behavior is not typically affected by low levels of human activity or activities which are predictable (Abbate *et al.* 1999, 2000; AGFD unpubl. data). Low-density (< 3 houses per acre) residential areas and roads with

low traffic volumes are examples of this type of activity. However, high levels of human activities, high-intensity activities, or activities which cannot be predicted may affect the areas pygmy-owls will use for nesting, foraging, and dispersal (AGFD unpubl. data). High-density (3 houses per acre) residential, commercial areas with lights and constant high levels of activity or unpredictable activities of any level, ball fields, and roads with high traffic volumes are some examples of activity levels that could potentially affect pygmy-owl behavior and habitat use. Habitat elements should be configured, and human activities should be minimized, so dispersal and other pygmy-owl activities within its home range are not impeded.

In the proposed critical habitat rule, we identify activities that may destroy or adversely modify critical habitat including those that alter the primary constituent elements to the extent that the value of critical habitat for the conservation of the species is appreciably diminished. Such activities may include, but are not limited to: (1) activities such as clearing of vegetation that appreciably reduce the value of the critical habitat for breeding; (2) activities such as clearing vegetation, road-building, or recreation that appreciably reduce the value of the critical habitat for connectivity; (3) activities such as clearing of vegetation, water diversion or impoundment, or high-impact recreation that appreciably reduce the value of the critical habitat for feeding by pygmy-owls; (4) activities that appreciably reduce the value of the critical habitat for other biological purposes (e.g., roosting, rearing, or other normal behavior patterns). The predominant federally funded programs and actions that may be affecting proposed critical habitat in the action area are: (1) funding or approval of road development, realignment, widening, or maintenance by the Federal Highway Administration resulting in the significant loss or degradation of the primary constituent elements; and (2) approval of actions related to grazing, mining, recreation, and land planning by the BLM and NPS that result in a significant loss or degradation of the primary constituent elements (U.S. Fish and Wildlife Service 2002).

## EFFECTS OF THE ACTION

The action area is an important part of the range of the pygmy-owl, and encompasses all of pygmy-owl proposed critical habitat unit 5, and pygmy-owl recovery area 8. Typically, 3-5 occupied territories have been located on Organ Pipe Cactus NM in any one year over the past decade, representing a strong-hold for the species in the area. The action area contains large areas of wilderness with small concentrations of disturbed areas (e.g. the Visitor's Center area). Survival and recovery of the pygmy-owl will be dependent on the availability of suitable habitat in this area for offspring to be able to successfully disperse and establish new territories. Pygmy-owls also require habitat linkages, within and among territories for movement and dispersal, consisting of continuous cover or patches of trees and large shrubs spaced at regular intervals, to provide concealment and protection from predators and mobbing, as well as shade and cover to moderate temperature extremes (S. Richardson, AGFD unpubl data, Abbate *et al.* 1999).

The proposed action will result in the permanent loss of an unspecified amount of Sonoran Desert scrub, much of which is proposed critical habitat for pygmy-owl that has the potential to provide for breeding, feeding or sheltering. Development such as new construction of trails, roads, buildings, etc., as well as the expansion of existing facilities, including existing roads and trails will cause habitat loss and/or modification. Completed and planned GMP roadway construction projects include construction of interpretive waysides at scenic drive entrances, trenching and widening of South Puerto Blanco Drive, construction of approximately 800 feet of new roadway at Twin Peaks, installation of a turn-around and approximately 400 feet of new road on Puerto Blanco Drive, and construction of rest areas or pull-outs on SR 85. Completed and planned GMP trail construction includes 8 new trails totaling 8.9 miles. New trails being established include the Red Tanks Tinaja to Milton Mine Trail, and Baker Mine to Milton Mine Trail, and a new trail around Pinkley Peak. Construction of new buildings would occur primarily in the Twin Peaks area, including a new Visitor Center, a new sciences and resource management center, new ranger operations and fire station building, new parking area for employees,

new maintenance area, new community center and a new utility building. We estimate that in total these projects will result in the loss of less than 30 acres of suitable pygmy-owl habitat, much of which is proposed critical habitat. Development would not occur in areas of Organ Pipe Cactus NM known to be occupied by pygmy-owls. NPS attempts to salvage plant species such as organ pipe, saguaros and ironwoods in the areas impacted by new construction and replant these species in rehabilitating disturbed areas. Salvaging saguaros, organ pipe, ironwood, mesquites, and palo verde and subsequent revegetation will help reduce the net loss of pygmy-owl habitat from GMP projects.

Some NPS actions are likely to result in beneficial effects to pygmy-owl habitat. Actions to remove and/or control buffelgrass will allow natural vegetation processes within Organ Pipe Cactus NM to return, reducing the likelihood of fire, thereby protecting pygmy-owl habitat. The NPS has proposed to continue to fund and expand this program to include additional non-native species such as Sahara mustard. Control of trespass livestock into Organ Pipe Cactus NM will reduce pygmy-owl habitat alteration associated with grazing. Law enforcement efforts to control illegal immigrant and drug traffic should decrease the amount of human presence in pygmy-owl habitat, and limit habitat destruction. The NPS plans to acquire two sections (1,280 acres) of State land within Organ Pipe Cactus NM. The purchase of these lands will benefit pygmy-owls, especially the Growler Wash/Bates well purchase, which contains occupied pygmy-owl habitat, by affording them the protection conveyed to designated wilderness in a national monument.

Part of the proposed action involves relocating powerlines and placing powerlines underground. This would likely result in disturbance to pygmy-owl habitat. However, relocating the powerline corridor and revegetating the disturbed area may result in reducing use of this corridor by undocumented migrants and smugglers.

The proposed action is likely to result in disturbance to pygmy-owls. Studies have suggested that human activities within breeding and nesting territories could affect raptors by changing home range movements (Anderson *et al.* 1990) and causing nest abandonment (Postovit and Postovit 1987, Porter *et al.* 1973). The construction of roads and parking areas will be relatively short-term events, with foreseeable ends in noise disturbance activities. However, noise disturbance, increased vehicle traffic, and human activity within developed areas after development will be a permanent effect. Increased noise levels may significantly disrupt normal behavioral patterns including breeding, feeding, and sheltering. Pygmy-owls may be tolerant, to some extent, of certain low-level noise disturbances associated with a few scattered recreational facilities and seasonal light traffic.

## Summary

The proposed action will cause some habitat loss and modification including some loss of critical habitat, as well as short-term noise disturbance and human activity associated with construction and long-term noise disturbance and human activity from use of recreational developments. Survival and recovery of the pygmy-owl will require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting owls. The action area contains lands with a variety of human uses, from recreation to cattle grazing and surface mining, all of which affect the pygmy-owl to various degrees. At a large scale, connectivity is necessary among large blocks of suitable habitat that are either currently known to have nesting owls or are important for recovery. Organ Pipe Cactus NM provides an important area in terms of what may be a source population for pygmy-owls to disperse into adjacent areas such as Cabeza Prieta NWR, BMGR, the Tohono O'odham Nation, and the BLM Ajo allotments. Organ Pipe Cactus NM may also act as a corridor for pygmy-owls dispersing from Mexico.

At a finer scale, the protection of habitat within the vicinity of known owl sites for establishment of new sites and movement between them is also essential. Connectivity between breeding and non-breeding



owls and areas where juvenile owls can establish new nesting territories or replace owls as they die are essential for the conservation of the pygmy-owl.

## **CUMULATIVE EFFECTS**

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative effects to pygmy-owls are similar to those described earlier for Sonoran pronghorn. Residential and commercial development, recreation, off-road vehicle use, grazing, and other activities on state and private lands continue to degrade or destroy pygmy-owl habitat and increase the likelihood of disturbance to pygmy-owls due to increased human presence. The ever increasing number of illegal border crossings by undocumented immigrants and smugglers, and associated illegal activities result in damage to habitat. Cutting of firewood can remove potential nest trees, and illegal campfires result in an increased risk of wildfire (NPS 2001).

## **CONCLUSION**

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed and ongoing NPS action, and the cumulative effects, it is our biological opinion that the proposed action is neither likely to jeopardize the continued existence of the pygmy-owl nor result in destruction or adverse modification of proposed critical habitat. Our rationale for this finding is described below.

NPS has proposed the following conservation measures that significantly reduce the effects of the proposed action on the pygmy-owl:

1. NPS will work to develop better information on the number and distribution of pygmy-owls on Organ Pipe Cactus NM, implementing a new program, once funding is available, that specifically targets the species.
2. NPS will protect known pygmy-owl locations and proposed critical habitat by mutually developing with the Border Patrol a comprehensive plan to manage human activity in backcountry areas associated with illegal traffic and associated law enforcement actions. The plan will specifically address minimization of noise and human activities near any pygmy-owl nests and known areas of pygmy-owl occurrence such as the Armenta Southeast, Boundary Site, Kuakatch, Growler, and Arch survey areas. The plan will be in place and a copy provided to us by January 31, 2004.
3. To further protect known owl locations and proposed critical habitat NPS will acquire and add to Organ Pipe Cactus NM the section of state lands containing Growler Canyon (R7W, T14S, Section 36 Bates Well Quad).

While we estimate that in total the proposed action will result in the loss of up to 30 acres of suitable pygmy-owl habitat, much of which is proposed critical habitat, this loss will not reduce the value of critical habitat unit 5 so that the survival and recovery of the pygmy-owl will be appreciably reduced. The action area encompasses all of critical habitat unit 5. The purpose of critical habitat unit 5 is to protect and maintain known breeding areas, provide connectivity to Mexico and the Tohono O'odham Nation, and allow for expansion of this sub-population through dispersal. We believe that Organ Pipe Cactus NM's proposed action is consistent with the intent of the proposed critical habitat rule, and that

the loss of habitat from the proposed action is minimized by the acquisition of 1,280 acres of critical habitat, including 640 acres containing known nesting areas (Growler Wash).

All of recovery area 8 in the pygmy-owl recovery plan occurs within the action area. The primary purposes of recovery area 8 are to protect existing pygmy-owl sites and breeding habitat, and to serve as link to habitat and breeding pygmy-owls in Mexico. The recovery plan identifies recreational activities and border crossing management as the primary management concerns in recovery area 8. Organ Pipe Cactus NM's proposed action is consistent with the recovery plan in that it includes conservation measures that provide for the protection of existing pygmy-owl sites and breeding habitat, it specifically addresses the identified management concerns, and specifically addresses the need to develop better information about the species.

In summary, our conclusion that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl is based on our analysis of the status of the pygmy-owl rangewide, the environmental baseline, the effects of the proposed action, and the cumulative effects. The status of the pygmy-owl has declined dramatically from historical levels and continues to be in decline. The 2002 drought resulted in an observed 82 percent reduction in nesting. Fragmentation of populations, loss of historical habitats, and human-caused loss and modification of remaining habitats and disturbance of pygmy-owls are the most important causes of poor status. Cumulative effects, particularly illegal crossings of the border and travel through pygmy-owl habitat by smugglers and undocumented immigrants and associated response by law enforcement, add additional significant stressors to pygmy-owl populations in the action area.

At the current time the environmental baseline with respect to the pygmy-owl is declining. However, preliminary results of surveys in Sonora, Mexico, indicate significant populations (which are not listed, but may contribute individuals to the listed population through immigration) of the pygmy-owl may remain in Mexico. NPS can mitigate its contribution to future declines of the pygmy-owl through prompt and full implementation of their conservation measures. NPS can do nothing to mitigate for the decline of the pygmy-owl caused by drought and development outside of its borders. When added to the environmental baseline, the status of the species, and cumulative effects, the effects of NPS's proposed action, which includes significant new conservation measures, do not reduce appreciably the likelihood of survival and recovery of the distinct population segment in the wild. Therefore, the continuing NPS action, with modifications and conservation measures, will not jeopardize the continued existence of the pygmy-owl. As proposed, NPS actions do not significantly adversely affect important pygmy-owl nesting areas or result in the destruction or adverse modification of critical habitat. Concerns about habitat deterioration and human caused disturbance are minimized by NPS's conservation measures. In determining that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl or destroy or adversely modify its proposed critical habitat, we assume that the conservation measures will be implemented fully and promptly.

## **INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is

incidental to and not intended as part of the agency action is not considered to be prohibited taking under the provided that such taking is in compliance with the terms and conditions of this incidental take statement.

### **Amount or Extent of Take Anticipated**

We do not anticipate the proposed action will incidentally take any pygmy-owl based on the current project description and prompt implementation of the conservation measures.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementing the following actions:

1. NPS should assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved (see U.S. Fish and Wildlife Service 2003).
2. Saguaro and organ pipe cacti in construction areas should be left in place if possible. If they must be removed, they should be transplanted to disturbed areas of Organ Pipe Cactus NM.
3. NPS should hire a full-time recovery projects coordinator for listed species at Organ Pipe Cactus NM. This coordinator could seek funding and facilitate implementation of proposed conservation measures for the pygmy-owl, lesser long-nosed bat, and other species; and serve as the Monument's contact for cooperative projects and coordination throughout the ranges of listed species occurring at the Monument.

### **DISPOSITION OF DEAD OR INJURED LISTED ANIMALS**

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: (480) 967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured animals should be transported to a qualified veterinarian by a qualified biologist. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

### **REINITIATION STATEMENT**

This concludes formal consultation on the Organ Pipe Cactus NM GMP. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect

listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and assistance throughout this consultation process. Any questions or comments should be directed to Steven L. Spangle of the Arizona ESO at (602) 242-0210 (x244).

/s/ Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)  
Regional Solicitor, Department of the Interior, Albuquerque, NM  
Robert Gulley, Department of Justice, Washington, D.C.  
Assistant Supervisor, Fish and Wildlife Service, Tucson, AZ

John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ  
State Director, Bureau of Land Management, Phoenix, AZ  
Field Office Manager, Yuma Field Office, Bureau of Land Management, Yuma, AZ  
Field Office Manager, Phoenix Field Office, Bureau of Land Management, Phoenix, AZ  
Colonel James Uken, Barry M. Goldwater Executive Council, Luke Air Force Base, AZ  
Lt. Colonel Debra Spear, Arizona Army National Guard, Phoenix, AZ  
Ronald Pearce, Director of Range Management, Marine Corps Air Station, Yuma, AZ  
Jefford Francisco, Tohono O'odham Nation, Sells, AZ  
Peter Ruiz, Director of Natural Resources, Tohono O'odham Nation, Sells, AZ  
Manager, Cabeza Prieta National Wildlife Refuge, Ajo, AZ

# LITERATURE CITED

- Abbate, D., A. Ditty, S. Richardson, and R. Olding. 1996. Cactus ferruginous pygmy-owl survey and nest monitoring in the Tucson Basin area, Arizona: 1996. Final Rep. Internal Enhance. #U95503, Arizona Game and Fish Dept., Phoenix.
- Abbate, D., S. Richardson, R. Wilcox, M. Terrio, and S. Belhumeur. 1999. Cactus ferruginous pygmy-owl investigations in Pima and Pinal and Fish Department Region 5 Wildlife Program. Phoenix. 83 pp.
- Abbate, D.J., W.S. Richardson, R.L. Wilcox, and S. Lantz. 2000. Cactus ferruginous pygmy-owl investigations in Pima and Pinal Counties, Arizona: 1999. Reg. V Wldlf. Prog. Arizona Game and Fish Dept. Tucson.
- Anderson, D.E., O.J. Rongstad, and W.R. Mytton. 1990. Home range changes in post-breeding raptors exposed to increased human activity levels in southeastern Colorado. *Wildlife Society Bulletin*. 18:134-142.
- Arizona Game and Fish Department. 1981. The Sonoran pronghorn. Special Report No. 10. Arizona Game and Fish Department, Phoenix, AZ.
- Arizona Game and Fish Department. 1985. Interim report on the Sonoran pronghorn (*Antilocapra americana sonoriensis*). Oct. 1983 - March 1985. Arizona Game and Fish Department, Phoenix, AZ.
- Arizona Game and Fish Department. 1986. Final Report on Sonoran Pronghorn Status in Arizona, Arizona Game and Fish Department, Phoenix, AZ. 132 pp.
- Bendire, C.E. 1888. Notes on the habits, nests, and eggs of the genus *Glaucidium* Boie. *Auk* 5:366-372.
- Bent, A.C. 1938. Life histories of North American birds of prey, part 2. U.S. National Museum Bulletin 170. 482 pp.
- Breninger, G.F. 1898. The ferruginous pygmy-owl. *Osprey* 2(10):128 (*In* Bent 1938).
- Bright, J.L., J.J. Hervert, L.A. Piest, R.S. Henry, and M. T. Brown. 1999. Sonoran pronghorn 1998 aerial survey summary. Nongame and Endangered Wildlife Program Technical Report No. 152. Arizona Game and Fish Department, Phoenix, AZ.
- Bright, J.L., J.J. Hervert, and M.T. Brown. 2001. Sonoran pronghorn 2000 aerial survey summary. Technical Report No. 180. Arizona Game and Fish Department, Phoenix, AZ.
- Bright, J.L. and C. van Riper, III. 2000. Pronghorn home ranges, habitat selection and distribution around water sources in Northern Arizona. U.S. Geological Survey Technical Report Series USGSFRES/COPL/2000/18.
- Brown, D.E. 1994. (ed) Biotic communities: Southern United States and Northwestern Mexico. Univ. of Utah Press, Salt Lake City.
- Byers, J.A. 1997. American Pronghorn, Social Adaptations and the Ghosts of Predators Past. University of Chicago Press, Chicago, IL.

Canadian Cooperative Wildlife Health Center Newsletter, Winter 1999, volume 6(2).

Carothers, S.W. 1977. Importance, preservation, and management of riparian habitats: an overview. Pp. 2-4 *in* Importance, preservation, and management of riparian habitats: a symposium (R.R. Johnson and D.A. Jones, tech. coords.). GTR-RM-43; USDA For. Serv., Rocky Mountain Forest and Range Exper. Stat., Fort Collins, CO.

Carr, J.N. 1970. Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.

Carr, J.N. 1971. Progress report-Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.

Carr, J.N. 1972. Progress report-Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.

Carr, J.N. 1974. Complete report-Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.

Cassier, E.F., D.J. Freddy, E.D. Ables. 1992. Elk responses to disturbance by cross-country skiers in Yellowstone National Park. *Wildlife Society Bulletin* 20: 375-381.

Catron, J.E., and D.M. Finch (eds.). 2000. Ecology and conservation of the cactus ferruginous pygmy-owl. USDA, Forest Service, General Technical Report RMRS-GTR-43.

Cherkovich, G.M., and S.K. Tatoyan. 1973. Heart rate (radiotelemetric registration) in macaques and baboons according to dominant-submissive rank in a group. *Folia Primatol* 20:265-273.

Dahl, T.E. 1990. Wetland losses in the United States, 1780s to 1980s. USDI Fish and Wildl. Serv., Washington, D.C. 13 pp.

Dames and Moore. 1995. Biological assessment for the Marine Corps Use of the Barry M. Goldwater Range, Arizona. Report to Marine Corps Air Station, Yuma, AZ.

Davis, W.A. and S.M. Russell. 1979. Birds in southeastern Arizona. Tucson Audubon Soc., Tucson, AZ.

Davis, W.A. and S.M. Russell. 1984. Birds in southeastern Arizona. Tucson Audubon Society, Tucson, AZ. 169 pp.

Davis, W.A. and S.M. Russell. 1990. Birds in southeastern Arizona. 3rd ed. Tucson Audubon Soc., Tucson, AZ.

Davis, W.A. and S.M. Russell. 1999. Finding birds in southeastern Arizona. 5<sup>th</sup> edition. Tucson Audubon Society, Tucson, AZ. 302 pp.

Defenders of Wildlife. 1998. Population viability analysis workshop for the endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*) in the United States. Defenders of Wildlife unpublished manuscript, Washington, D.C.

deVos, J.C. 1990. Selected aspects of Sonoran pronghorn research in Arizona and Mexico. *In* P.R. Krausman and N.S. Smith, eds., Proceedings of the Symposium: Managing Wildlife in the Southwest. Tucson, AZ.

- deVos, J.C. 1998. Habitat selection patterns by Sonoran pronghorn in southwest Arizona. *In* T.J. Tibbetts and G.J. Maender, eds., First Conference on Research and Research Management in Southern Arizona: Extended abstracts. Organ Pipe Cactus National Monument and Cooperative Park Studies Unit, University of Arizona, Tucson, AZ.
- Earhart, C.M., and N.K. Johnson. 1970. Size dimorphism and food habits of North American owls. *Condor* 72(3):251-264.
- Ehrlich, P.R., and J. Roughgarden. 1987. *The Science of Ecology*. MacMillan Publishing Co., New York, N.Y.
- Falls, B.A. 1973. Noteworthy bird records from south Texas (Kennedy County). *Southwest. Nat.* 18:244-247.
- Felger, R.S. 1980. Vegetation and flora of the Gran Desierto. *Desert Plants* 2(2):87-114.
- Felger, R.S. 2000. *Flora of the Gran Desierto and Rio Colorado of Northwestern Mexico*. University of Arizona Press, Tucson, AZ.
- Fisher, A.K. 1893. *The hawks and owls of the United States in their relation to agriculture*. U.S. Gov. Print. Off., Washington DC.
- Flesch, A.D. and R.J. Steidl. 2000. Distribution, habitat and relative abundance of cactus ferruginous pygmy-owls in Sonora, Mexico: 2000 annual report. School of Renewable Natural Resources, University of Arizona, Tucson, Arizona.
- Fox, L.M., P.R. Krausman, M.L. Morrison, and R.M. Kattnig. 1997. Nutritional content of forage in Sonoran pronghorn habitat, Arizona. Masters Thesis, University of Arizona, Tucson, AZ.
- Fox, L.M., P.R. Krausman, M.L. Morrison, and R.M. Kattnig. 2000. Water and nutrient content of forage in Sonoran pronghorn habitat, Arizona. *California Fish and Game* 86(4): 216-232.
- Friedmann H., L. Griscom, and R.T. Moore. 1950. *Birds of Mexico. Part I. Pac. Coast Avifauna* 29.
- Geist, V. 1971. A behavioral approach to the management of wild ungulates. *In* E. Duffy and A.S. Watts, eds., *The Scientific Management of Animal and Plant Communities for Conservation*. Symposium of the British Ecological Society No. 11. Blackwell Science Publications, Oxford, U.K.
- Gilman, M.F. 1909. Some owls along the Gila River in Arizona. *Condor* 11:145-150.
- Gilpin, M.E. and M.E. Soulé. 1986. Minimum viable populations: processes of extinction. *In* M.E. Soulé, ed., *Conservation Biology: The science of scarcity and diversity*. Sinauer Associates, Sunderland, MA.
- Goldman, E.A. 1945. A new pronghorn from Sonora. *Proceedings of the Biological Society, Washington* 58:3-4.
- Griscom, L. and M.S. Crosby. 1926. Birds of the Brownsville region, southern Texas. *Auk* 43:18-36.
- Gryimek, H.C.B. (ed.). 1972. *Gryimek's animal life encyclopedia*. Van Nostrand Reinhold Co., New York.

- Hall, E.R. 1981. The mammals of North America. John Wiley and Sons, New York, NY.
- Halloran, A.F. 1957. A note on Sonoran pronghorn. *J. Mammal.* 38(3):423.
- Hamr, J. 1988. Disturbance behavior of chamois in an alpine tourist area of Austria. *Mountain Research and Development* 8:65-73.
- Harlow, H.J., E.T. Thorn, E.S. Hilliams, E. L. Belden, and W.A. Gern. 1987. Cardiac frequency: a potential predictor of blood cortisol levels during acute and chronic stress exposure in Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *Canadian Journal of Zoology* 65:2028-2034.
- Hecht, A. and P.R. Nickerson. 1999. The need for predator management in conservation of some vulnerable species. *Endangered Species Update* 16:114-118.
- Hervet, J.J. 1996. Deposition; Defenders of Wildlife *et al.* vs Sheila Widnal *et al.* Recorded by Bort Court Reporting Services, Yuma, AZ.
- Hervet, J.J., L.A. Piest, R.S. Henry, and M.T. Brown. 1997a. Sonoran pronghorn 1996 aerial survey summary. Nongame and Endangered Wildlife Program Technical Report No. 124. Arizona Game and Fish Department, Phoenix, AZ.
- Hervet, J.J., L.A. Piest, W. Ballard, R.S. Henry, M.T. Brown, and S. Boe. 1997b. Sonoran pronghorn population monitoring: progress report. Nongame and Endangered Wildlife Program Technical Report 126. Arizona Game and Fish Department, Phoenix, AZ.
- Hervet, J.J., J.L. Bright, M.T. Brown, L.A. Piest, and R.S. Henry. 2000. Sonoran pronghorn population monitoring: 1994-1998. Nongame and Endangered Wildlife Program Technical Report No. 162. Arizona Game and Fish Department, Phoenix, AZ.
- Heuschele, W.P. 2002. Center for Reproduction of Endangered Species (CRES) Zoological Society of San Diego (San Diego Zoo). University of Georgia, College of Veterinary Medicine Foreign Animal Diseases: Malignant Catarrhal Fever. At [www.vet.uga.edu](http://www.vet.uga.edu)
- Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press, Tucson.
- Howerth, E.W. and D.E. Stallknecht. 2002. Hemorrhagic Disease in Wildlife in the United States. At Western College of Veterinary Medicine, University of Saskatchewan website [www.usask.ca/wcvm](http://www.usask.ca/wcvm)
- Howerth, E.W., D.E. Stallknecht, and P.D. Kirkland. 2001. Bluetongue, Epizootic Hemorrhagic Disease, and Other Orbivirus-Related Diseases. In *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Williams, Elizabeth, S. and Ian K. Barker (eds). Iowa State Press, Ames, IA.
- Hughes, K.S., and N.S. Smith. 1990. Sonoran pronghorn use of habitat in Southwest Arizona. Report to Cabeza Prieta National Wildlife Refuge, Ajo, AZ.
- Humphrey, R.R. 1987. 90 Years and 535 Miles, Vegetation Changes Along the Mexican Border. University of New Mexico Press, Albuquerque, NM.
- Hunter, W.C. 1988. Status of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) in the United States and Northern Mexico. U.S. Fish and Wildlife Service, Phoenix, Arizona. 13 pp.



- Inouye, R.S. 1991. Population biology of desert annual plants. Pages 27-54 in G.A. Polis (ed), *The Ecology of Desert Communities*. University of Arizona Press, Tucson.
- Jahrsdoerfer, S.E. and D.M. Leslie, Jr. 1988. Tamaulipan brushland of the Lower Rio Grande Valley of South Texas: description, human impacts, and management options. *USDI Fish and Wildl. Serv. Biol. Rep.* 88(36).
- Jeppesen, J.L. 1987a. The disturbing effects of orienteering and hunting on roe deer (*Capreolus capreolus*). *Danish Review of Game Biology* 13:1-24.
- Jeppesen, J.L. 1987b. Immediate reactions of red deer (*Cervus elaphus*) to orienteering and hunting in a Danish environment (in Danish with an English summary). *Danske Vildtundersogelser* 43:1-26.
- Johnsgard, P.A. 1988. *North American owls*. Smithsonian Institution Press, Washington, D.C. 295 pp.
- Johnson, R.R., and L.T. Haight. 1985. Status of the ferruginous pygmy-owl in the southwestern United States. Abstracts, 103rd Stated Meeting of the American Ornithologists' Union, Arizona State University, Tempe, Arizona.
- Johnson, R.R., L.T. Haight, and J.M. Simpson. 1979. Owl populations and species status in the southwestern United States. Pp. 40-59 in P. Schaffer and S.M. Ehler (eds.), *Owls of the west: their ecology and conservation*. Proc. Natl. Audubon Soc., George Whittel Education Center, Tiburon, CA.
- Johnson, B.K., F.G. Lindzey, and R.J. Guenzel. 1991. Use of aerial line transect surveys to estimate pronghorn populations in Wyoming. *Wildlife Society Bulletin* 19:315-321.
- Johnson-Duncan, E.E., D.K. Duncan, and R.R. Johnson. 1988. Small nesting raptors as indicators of change in the southwest desert. pages 232-236 in R.L. Glineski *et al.*, eds. *Proceedings of the Southwest Raptor Management Symposium and Workshop*. Nat'l. Wildl. Fed., Washington, D.C. 395 pp.
- Kindschy, R.R., C. Sundstrom, and J.D. Yoakum. 1982. *Wildlife habitats in managed rangelands - the Great Basin of southeastern Oregon: pronghorn*. General Technical Report PNW-145. U.S. Department of Agriculture, Northwest Forest and Range Experimental Station, Portland, OR.
- Klein, K. 2000. Mass smugglings of immigrants on the increase. March 13, *Desert Sun*, Palm Springs, [www.thedesertsun.online.com](http://www.thedesertsun.online.com).
- Knight, R.L. and K.J. Gutzwiller, eds. 1995. *Wildlife and recreationists: coexistence through management and research*. Island Press, Washington, D.C. 372 pp.
- Krausman, P.R., L.K. Harris, and J. Francine. 2001. Long-term study of the noise effects of military overflights on the Sonoran pronghorn, Barry M. Goldwater Range, Luke Air Force Base, Arizona. U.S. Air Force Contract F41624-98-C-8020-P00003.
- Kreplin, C. 2002. *Leptospirosis in Farm Animals*. University of Alberta, Agriculture, Food and Rural Development Home Page, [www.agric.gov.ab.ca](http://www.agric.gov.ab.ca)
- Kusler, J.A. 1985. A call for action: protection of riparian habitat in the arid and semi-arid West. Pp. 6-8 in *Riparian ecosystems and their management: reconciling conflicting uses, first North American*

- Riparian Conference (R.R. Johnson et al., tech. coords.). GTR-RM-120; USDA For. Serv., Rocky Mountain Forest and Range Exper. Stat., Fort Collins, CO.
- Leftwich, T.J., and C.D. Simpson. 1978. The impact of domestic livestock and farming on Texas pronghorn. Pronghorn Antelope Workshop Proceedings 8:307-320.
- Leighton, F.A. 2001. Other Bacterial Infections. *Fusobacterium necrophorum* Infection. In *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Williams, Elizabeth, S. and Ian K. Barker (eds). Iowa State Press, Ames, IA.
- Leighton, F.A. and Kuiken, T. 2001. Miscellaneous Bacterial Diseases: Leptospirosis. In *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Williams, Elizabeth, S. and Ian K. Barker (eds). Iowa State Press, Ames, IA.
- Marine Corps Air Station-Yuma. 2001. Yuma Training Range Complex draft supplemental environmental impact statement. U.S. Department of Defense, Marine Corps Air Station, Yuma, AZ.
- Marsh, S.E., C. Wallace, and J. Walker. 1999. Evaluation of satellite remote sensing methods for regional inventory and mapping of desert resources. Arizona Remote Sensing Center, Office of Arid Lands, The University of Arizona, Tucson, AZ.
- McArthur, R.A., V. Geist, and R.H. Johnson. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. *Journal of Wildlife Management* 46:351-358.
- Mearns, E.A. 1907. Mammals of the Mexican boundary of the United States, Part 1. *Bulletin of the U.S. National Museum* 56:XVT530.
- Merck and Company. 1986. The Merck Veterinary Manual, Sixth Edition. Merck and Company, Inc., Rahway, NJ.
- Mikkelsen, C.W. and Woodbury, M. 2000. Necrobacillosis in Deer. University of Saskatchewan, Western College of Veterinary Medicine website. At [www.usask.ca/wcvm](http://www.usask.ca/wcvm)
- Millsap, B.A. and R.R. Johnson. 1988. Ferruginous pygmy-owl. Pages 137-139 in R.L. Glinski et al., eds. *Proceedings of the Southwest Raptor Management Symposium and Workshop*. Nat'l Wildl. Fed., Washington.
- Millstead, B. and B. Barns. 2002. Life on the border: monitoring the effects of border-crossing and law enforcement on natural resources. Page 32 in *Abstracts of the Fourth Conference on Research and Resource Management in the Southwestern Deserts: Meeting Resource Management Information Needs*. May 15-17, 2002, Tucson, Arizona.
- Moen, A.N., M.A. DellaFera, A.L. Hiller, and B.A. Buxton. 1978. Heart rates of white-tailed deer fawns in response to recorded wolf howls. *Canadian Journal of Zoology* 56:1207-1210.
- Monson, G. 1968. The desert pronghorn. In *Desert Bighorn Council Transactions*. Las Vegas, NV.
- Monson, G. and A.R. Phillips. 1981. Annotated checklist of the birds of Arizona. The Univ. of Arizona Press, Tucson. 240 pp.
- National Park Service. 2001. Final supplemental environmental impact statement, re-analysis of cumulative impacts on the Sonoran pronghorn. Organ Pipe Cactus National Monument, Ajo, AZ.

- National Park Service. 2002. Organ Pipe Cactus National Monument, Threatened and Endangered Species, Annual Summary of Activities, 2002.
- Nelson, F.W. 1925. Status of the pronghorn antelope, 1922-1924. U.S. Department of Agriculture Bulletin No. 1346.
- Nicol, A.A. 1941. Game reconnaissance of southwestern Arizona, South of the Gila River. Unpublished. Arizona Game and Fish Department, Phoenix, AZ.
- Nowak, R.M., and J.L. Paradiso. 1983. Walker's mammals of the world. 4<sup>th</sup> Ed. Vol. II. Johns Hopkins University Press, Baltimore, MD.
- Oberholser, H.C. 1974. The bird life of Texas. University of Texas Press. Austin, Texas. 1069 pp.
- Officer, J.E. 1993. Kino and agriculture in the Pimeria Alta. *Journal of Arizona History* 34:287-306.
- Paradiso, J.L., and R.M. Nowak. 1971. Taxonomic status of the Sonoran pronghorn. *Journal of Mammalogy* 52(4):855-858.
- Pfizer Animal Health. 2002. Respiratory Diseases in Dairy Cattle. Website At [www.pfizer.com](http://www.pfizer.com)
- Phelps, J.S. 1981. Habitat of the Sonoran pronghorn. *In* The Sonoran Pronghorn. Special Report No. 10. Arizona Game and Fish Department, Phoenix, AZ.
- Phillips, A.R., J. Marshall, and G. Monson. 1964. The birds of Arizona. University of Arizona Press, Tucson. 212pp.
- Pinkava, D.J. 1999. Cactaceae Cactus Family, Part Three. *In*: Vascular Plants of Arizona: Cactaceae - *Cylindropuntia*. *Journal of the Arizona- Nevada Academy of Science* 32(1):32-47.
- Porter, R.D., C.M. White, and R.J. Erwin. 1973. The peregrine falcon in Utah, emphasizing ecology and competition with the prairie falcon. Brigham Young Univ., *Bulletin of Biological Science*. 18:1-74.
- Postovit, H.R. and B.C. Postovit. 1987. Impacts and mitigation techniques. Pp. 183-213 *in* G.B. Pendleton, B.A. Mildsap, K.W. Cline, and D.M. Bird (eds.), Raptor management techniques manual. National Wildlife Federation, Washington, D.C. Scientific Technical Series 10.
- Proudfoot, G. 1996. Natural history of the cactus ferruginous pygmy-owl. MS Thesis, Texas A & M University, Kingsville, Texas.
- Proudfoot, G.A. and S.L. Beasom. 1996. Responsiveness of cactus ferruginous pygmy-owls to broadcasted conspecific calls. *Wildl. Soc. Bull.* 24:294-297.
- Proudfoot, G.A., and R.R. Johnson. 2000. Ferruginous pygmy-owl. *In* A. Poole and F. Gill (eds.), *The Birds of North America*. Cornell Laboratory of Ornithology and The Academy of Natural Sciences, No. 498.
- Proudfoot, G.A. and R.D. Slack. 2001. Comparisons of ferruginous pygmy-owl mtDNA at local and international scales. Report to Charles H. Huckelberry, Pima County, Contract Agreement #07-30-T-125759-0399.

- Reed, J.M., P.D. Doerr, and J.R. Walters. 1986. Determining minimum population sizes for birds and mammals. *Wildlife Society Bulletin* 14:225-261.
- Reichenbacher, F.W., and R.B. Duncan. 1989. Sanborn's bat and rare plant studies at Barry M. Goldwater Bombing Range, Yuma County, AZ. Final Report. F.W. Reichenbacher and Associates, Tucson, AZ.
- Richter-Dyn, N., and N.S. Goel. 1972. On the extinction of a colonizing species. *Theoretical Population Biology* 3:406-433.
- Rowlands, P.G. 2000. Low temperature and other climatic trends at Organ Pipe Cactus National Monument. *In* W.L. Halvorson and B.S. Gebow, eds., *Creative Cooperation in Resource Management*, extended abstracts. U.S. Geological Survey, Western Ecological Research Center, Sonoran Desert Field Station, University of Arizona, Tucson, AZ.
- Rutman, S. 1996. An assessment of accelerated erosion and its management at Organ Pipe Cactus National Monument. Unpublished report by Organ Pipe Cactus National Monument, Ajo, AZ.
- Rutman, S. 1997. Dirt is not cheap: livestock grazing and a legacy of accelerated soil erosion on Organ Pipe Cactus National Monument, Arizona. *In* J. M. Feller and D. S. Strouse, eds., *Environmental, economic, and legal issues related to rangeland water developments*. The Center for the Study of Law, Science and Technology, Arizona State University, Tempe, AZ.
- Samuel, M.D., and K.H. Pollock. 1981. Correction of visibility bias in aerial surveys where animals occur in groups. *Journal of Wildlife Management* 45(4):993-997.
- Scott, M.D. 1990. Determining a minimum genetically viable population size for Yellowstone pronghorns. *Proceedings Pronghorn Antelope Workshop* 14:26-27.
- Sheridan, T.E. 2000. Human ecology of the Sonoran Desert. *In* S.J. Phillips and P.W. Comus, eds., *A natural history of the Sonoran Desert*. Arizona-Sonora Desert Museum Press, Tucson, AZ.
- Sprunt, A. 1955. *North American birds of prey*. National Audubon Society, Harper and Brothers, New York. 227pp.
- State of Arizona. 1990. Final report and recommendations of the Governor's riparian habitat task force. Executive Order 89-16. Streams and riparian resources. October 1990. Phoenix, AZ. 28 pp.
- Stott, J.L. 2002. Foreign Animal Diseases: Bluetongue and Epizootic Hemorrhagic Disease. University of Georgia, College of Veterinary Medicine *At* [www.vet.uga.edu](http://www.vet.uga.edu)
- Sutton, G.M. 1951. *Mexican birds: First impressions based upon an ornithological expedition to Tamaulipas, Nuevo Leon and Coahuila*. Univ. of Oklahoma Press, Norman. 282pp.
- Swarth, H.S. 1914. A distributional list of the birds of Arizona. *Pac. Coast Avifauna* 10.
- Szaro, R.C. 1989. Riparian forest and scrubland community types of Arizona and New Mexico. *Desert Plants* 9:70-138.
- Tewes, M.E. 1995. Status of the ferruginous pygmy-owl in southern Texas and northeast Mexico. Proj. Rep. 2, Job 25, Texas Parks and Wildl. Dept. and Texas A&M Univ.-Kingsville.

- Thompson, R.D., C.V. Grant, E.W. Pearson, and G.W. Corner. 1968. Cardiac response of starlings to sound: effects of lighting and grouping. *American Journal of Physiology* 214:41-44.
- Turner, R.M. and D.E. Brown. 1982. Sonoran desert scrub. In D.E. Brown, ed., *Biotic communities of the American Southwest-United States and Mexico*. *Desert Plants* 4(1-4):181-222.
- U.S. Fish and Wildlife Service. 1982. Sonoran pronghorn recovery plan. United States Fish and Wildlife Service, Denver, CO.
- U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; determination of endangered status for the cactus ferruginous pygmy-owl in Arizona. *Fed. Reg.* 62:10730-10747.
- U.S. Fish and Wildlife Service. 1998a. Final revised Sonoran pronghorn recovery plan. United States Fish and Wildlife Service, Albuquerque, NM.
- U.S. Fish and Wildlife Service. 1998b. Final programmatic environmental assessment for the future management of Cabeza Prieta National Wildlife Refuge and draft comprehensive conservation plan. United States Fish and Wildlife Service, Albuquerque, NM.
- U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; designation of critical habitat for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). *Fed. Reg.* 64:37419-37440.
- U.S. Fish and Wildlife Service. 2001. Draft recovery criteria and estimates of time for recovery actions for the Sonoran pronghorn: a supplement and amendment to the 1998 final revised Sonoran pronghorn recovery plan. United States Fish and Wildlife Service, Albuquerque, NM.
- U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants; designation of critical habitat for the Arizona distinct population segment of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). *Fed. Reg.* 67:71032-71064.
- U.S. Fish and Wildlife Service. 2003. Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) draft recovery plan. Albuquerque, NM. 164 pp. plus appendices.
- U.S. Immigration and Naturalization Service. 2001. Draft report, environmental assessment for the proposed expansion of the Ajo U.S. Border Patrol Station, Why, Arizona. Immigration and Naturalization Service, Washington D.C.
- U.S. General Accounting Office (USGAO). 1988. Public rangelands: some riparian areas restored but widespread improvement will be slow. Rep. to Congress. Requesters, U.S. General Accounting Office, Washington D.C.
- van Rossem. 1945. A distributional survey of the birds of Sonora, Mexico. *Occasional Papers Mus. Zool.*, Louisiana State University. Baton Rouge, Louisiana. 379 pp.
- Villa, R.B. 1958. Partial account of Prof. Bernard Villa R. Concerning the study of bighorn sheep and antelope in northern Mexico. *Inst. Biol.*, Mexico, D.F. Unpublished.
- Wauer, R.H., P.C. Palmer, and A. Windham. 1993. The ferruginous pygmy-owl in southern Texas. *Am. Birds* 47:1071-1075.

- Wilcox, R.L., S. Richardson, and D. Abbate. 1999. Habitat characteristics of occupied cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) sites at the suburban/rural interface of north Tucson, Arizona. Report to Arizona Game and Fish Dept., Phoenix, AZ.
- Wilcox, R.L., S. Richardson, and D. Abbate. 2000. Habitat selection by cactus ferruginous pygmy-owls in southern Arizona - preliminary results. Arizona Game and Fish Dept., Tucson, AZ. 13 pp.
- Wildeman, G., and J.H. Brock. 2000. Grazing in the southwest: history of land use and grazing since 1540. In R. Jemison and C. Raish, eds., *Livestock management in the American southwest: ecology, society, and economics*. Elsevier Science, Amsterdam, The Netherlands.
- Williams, E.S. and I.K. Barker, (eds). 2001. *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Iowa State Press, Ames, IA.
- Wobeser, G. 2001. Miscellaneous Bacterial Infections. *Actinomyces* and *Arcanobacterium* Infections. In *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Williams, Elizabeth, S. and Ian K. Barker (eds). Iowa State Press, Ames, IA.
- World Organisation for Animal Health. 2002. Paris, France, At website [www.oie.int](http://www.oie.int)
- Workman, G.D., T.D. Bunch, J.W. Call, F.C. Evans, L.S. Neilson, and E.M. Rawlings. 1992. Sonic boom and other disturbance impacts on pronghorn antelope (*Antilocapra americana*). Report to the U.S. Air Force, Hill Air Force Base, UT.
- Wright, R.L., and J.C. deVos. 1986. Final report on Sonoran pronghorn status in Arizona. Contract No. F0260483MS143, Arizona Game and Fish Department, Phoenix, AZ
- Yoakum, J.D., B.W. O'Gara, and V.W. Howard, Jr. 1996. Pronghorn on western rangelands. In P.R. Krausman, ed., *Rangeland wildlife*. The Society for Range Management, Denver, CO.
- Yuill, T.M. and Seymour, C. 2001. Arbovirus Infections: St. Louis Encephalitis. In *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Williams, Elizabeth, S. and Ian K. Barker (eds). Iowa State Press, Ames, IA. p 100.
- Yuill, T.M. and Seymour, C. 2001a. Arbovirus Infections: Vesicular Stomatitis. In *Infectious Diseases of Wild Mammals*, 3<sup>rd</sup> Edition, Williams, Elizabeth, S. and Ian K. Barker (eds). Iowa State Press, Ames, IA. p 109.

Table 1. A summary of population estimates from literature and field surveys for Sonoran pronghorn in the U.S.

Date	Population estimate (95 percent CI <sup>a</sup> )	Source
1925	105	Nelson 1925
1941 <sup>b</sup>	60	Nicol 1941
1957	<1,000	Halloran 1957
1968	50	Monson 1968
1968-1974	50 - 150	Carr 1974
1981	100 - 150	Arizona Game and Fish Department 1981
1984	85 - 100	Arizona Game and Fish Department 1986
1992	179 (145-234)	Bright <i>et al.</i> 1999
1994	282 (205-489)	Bright <i>et al.</i> 1999
1996	130 (114-154)	Bright <i>et al.</i> 1999
1998	142 (125-167)	Bright <i>et al.</i> 1999
2000	99 (69-392)	Bright <i>et al.</i> 2001
2002	21 (18-33)	Bright <i>et al.</i> 2002

<sup>a</sup> Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

<sup>b</sup> Population estimate for southwestern Arizona, excluding Organ Pipe Cactus National Monument.

Table 2. Comparison of U.S. Sonoran pronghorn population surveys, 1992-2002.

Date	Pronghorn observed		Population estimates		
	On transect	Total observed	Density estimate using DISTANCE (95 percent CI <sup>a</sup> )	Lincoln-Peterson (95 percent CI)	Sightability model (95 percent CI)
Dec 92	99	121	246 (103-584)	---	179 (145-234)
Mar 94	100	109	184 (100-334)	---	282 (205-489)
Dec 96	71	82 (95 <sup>b</sup> )	216 (82-579)	162 (4-324)	130 (114-154)
Dec 98	74	86 (98 <sup>b</sup> )	---	172 (23-321)	142 (125-167)
Dec 00	67	69 <sup>b</sup>	---	---	99 (69-392)
Dec 02	18	0	---	---	21 (18-33)

<sup>a</sup> Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

<sup>b</sup> Includes animals missed on survey, but located using radio telemetry.

Table 3. Population estimates from literature and field surveys for Sonoran pronghorn in Mexico.

Date	Population estimate (95 percent CI <sup>a</sup> )	Source
1925	595	Nelson 1925
1957	>1,000	Villa 1958
1981	200-350	Arizona Game and Fish Department 1981
1993	414 (317-644)	Bright <i>et al.</i> 1999
2000	346 (288-445)	Bright <i>et al.</i> 2001
2002	280 <sup>b</sup>	Bright <i>et al.</i> unpubl. data

<sup>a</sup> Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

<sup>b</sup> These estimates are tentative and confidence intervals have not yet been generated.

Table 4. Comparison of Sonoran pronghorn surveys in Mexico, 1993, 2000, and 2002.



	Total number of pronghorn seen	Sightability model (95 percent CI <sup>a</sup> )
<i>March 1993</i>		
Southeast of Highway 8	163	289 (226-432)
West of Highway 8	51	124 (91-211)
Total	214	414 (317-644)
<i>December 2000</i>		
Southeast of Highway 8	249	311 (261-397)
West of Highway 8	17	34 (27-48)
Total	266	346 (288-445)
<i>December 2002</i>		
Southeast of Highway 8	19	25 <sup>b</sup>
West of Highway 8	195	255 <sup>b</sup>
Total		

<sup>a</sup> Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

<sup>b</sup> These estimates are tentative and confidence intervals have not yet been generated.

Table 5. Diseases transmissible between cattle and pronghorn.

<u>Actual Documented Disease</u>	<u>Reservoirs/Oddities/ Transmission Routes</u>	<u>Clinical Signs</u>	<u>Control</u>	<u>Citation(s)</u>
<b>BACTERIAL DISEASES</b>				
<u>Leptospirosis</u> <i>Leptospira interrogans</i> serovar <i>hardjo</i>	transmitted thru infected urine, fetal tissues or rarely aerosol; organism can live outside host for up to 6 months in soil, water or on vegetation; asymptomatic shedders can transmit the disease over the long-term	fever, blood-tinged urine, jaundice, renal failure, abortion	reduce contact among domestic and wild animals; reduce incidence of stagnant water and moist, warm conditions; control situations where virus can be shed	Merck (1986) Kreplin (2002)  Leighton and Kuiken (2001)
<b>VIRAL DISEASES</b>				
<u>Bluetongue</u> Bluetongue orbivirus (BTV)	vector = infected biting midge <i>Culicoides sonorensis</i> ; BTV also associated with cattle lice <i>Haematopinus eurysternus</i> ; infected blood and semen can also directly transmit disease; highest incidence of disease in July-Sept	fever, inflamed, ulcerated erosion in mouth; lameness; abortion; emaciation; sterility, growth delay, death	reduce vector attraction to fetid water sources; reduce contact, overcrowding and competition, particularly July to September	Howerth, <i>et al.</i> (2001)  World Organisation for Animal Health (2002)  Stott (2002)
<u>Epizootic hemorrhagic disease</u> Epizootic hemorrhagic disease orbivirus (EHDV)	vector = infected biting midges <i>Culicoides sonorensis</i> and <i>C. insignis</i>	depression, fever, uncoordinated gait (ataxia), "running fits"/convulsions/seizures, sudden death; sick and dead animals often found in or near water	reduce vector attraction to fetid, fecal-infested water sources; reduce contact, overcrowding and competition, particularly July to September	Howerth, <i>et al.</i> (2001)  Howerth and Stallknecht (2002)  Stott (2002)
<u>Pronghorn Exposure Documented by Antibody/Seroconversion</u>				
<b>BACTERIAL</b>				

<u>Arcanobacterium Infection associated with Fusobacterium Infection</u> <i>Arcanobacterium pyogenes</i> (previously known as <i>Corynebacterium pyogenes</i> ) and  <i>Fusobacterium necrophorum</i>	wound contact          associated with bacterial buildup at overcongregated water sources, particularly during summer drought	mucopurulent, suppurative abscesses; swollen mandible; difficulty chewing bronchopneumonia; intracranial abscesses leading to derangement  lameness when footrot exists, mouth lesions result in excess salivation, difficulty chewing and swallowing, infections of the stomach lining and labored breathing with debilitation	separate animals so that contact does not occur;       keep animals from overcrowding watering sources	Wobeser (2001)  Canadian Cooperative Wildlife Health Center (1999)  Leighton (2001)  Mikkelsen and Woodbury (2000)
<b>VIRAL</b>				
<u>Parainfluenza</u> Parainfluenza 3 Virus (PI-3V)	aerosol	fever, runny nose, coughing, difficulty breathing, ocular discharge, depression, poor appetite	handle animals with care; provide adequate feed and water; minimize exposure to contributing environmental conditions; avoid overcrowding; reduce stress	AGFD, unpubl. data  Pfizer Animal Health (2002)
<u>St. Louis Encephalitis</u> St. Louis Encephalitis arbovirus (SLEV)	vectors = mosquitoes; bats may serve as overwintering hosts	meningitis, encephalitis; central nervous system disease; death	mosquito control; surveillance of disease epidemic cycles	Yuill and Seymour (2001)
<u>Vesicular Stomatitis</u> Vesicular Stomatitis-New Jersey rhabdovirus (VSNJ)	vector = sand flies; disease of No. Am. horses, cattle, swine; documented in Mexico in pronghorn, bighorn sheep and deer	fever, large fluid-filled blisters on mouth, nose, lips, muzzle, above hoof, teats, loss of appetite, depression, excessive salivation	vector control; separation of affected species of ungulates	Yuill and Seymour, (2001a)
<u>Malignant Catarrhal Fever</u> Malignant Catarrhal Fever (MCF) gammaherpesvirus	aerosol or contact with nasal or ocular fluids; fecal contamination	Fever, profuse nasal discharge, corneal opacity, swollen lymph nodes, inflamed oral, ocular and nasal mucosae; occasionally central nervous signs with diarrhea, skin lesions and arthritis; high mortality rate	cattle kept separated from potential reservoirs; "stocking of cattle ranches with ...antelope, wild sheep or goats should be discouraged"	Heuschele and Reid (2001)  Heuschele (2002)

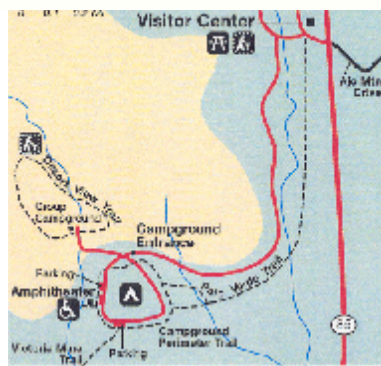
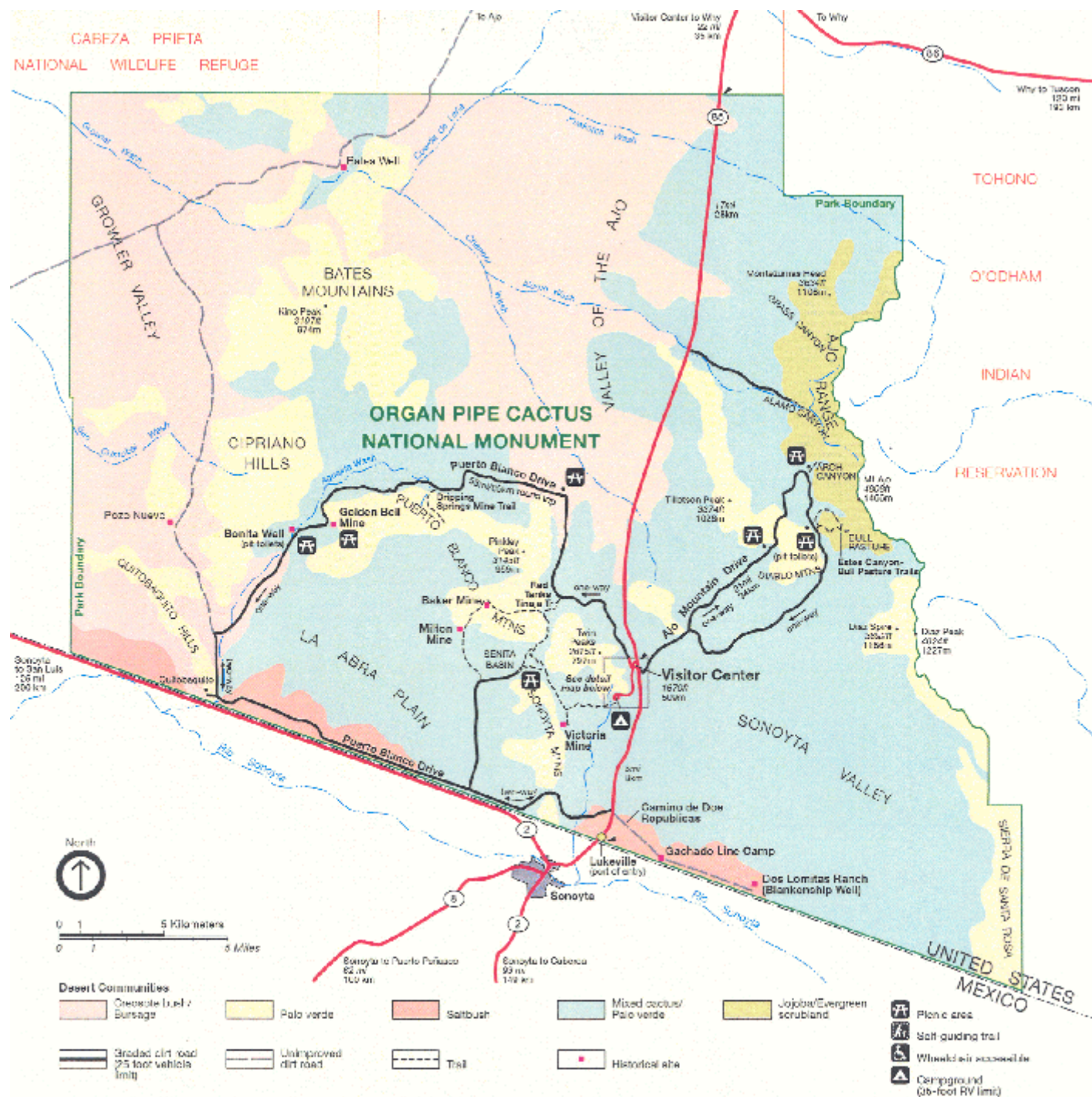


Figure 1. Organ Pipe Cactus National Monument.





Figure 2. Historic range of Sonoran pronghorn in the United States and Mexico.

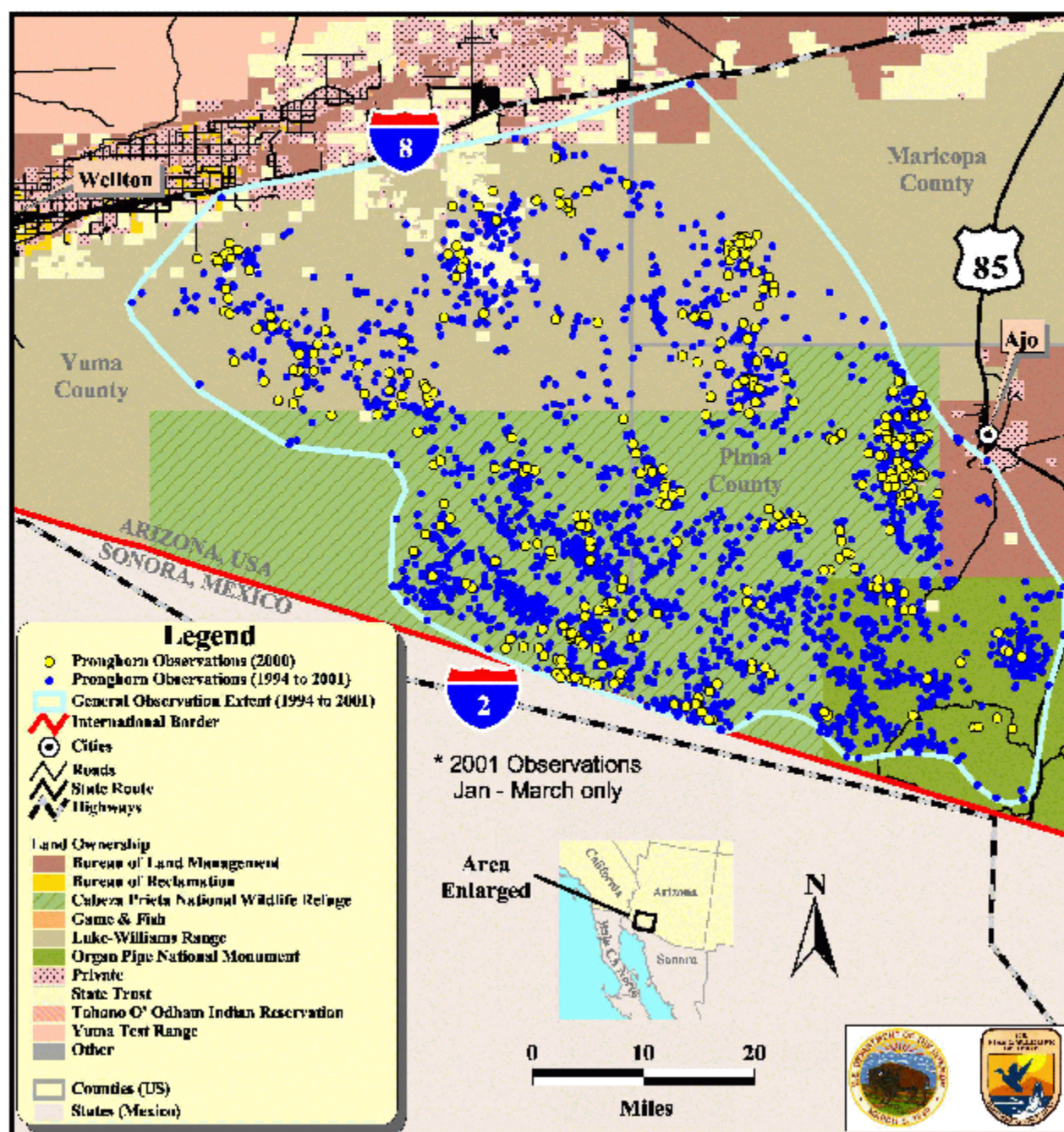


Figure 3. Current Sonoran pronghorn distribution in the United States: Records from 1994-2001.

Appendix 1. Sonoran pronghorn 51 recovery actions as presented to the Service's Region 2 Regional Director by the Sonoran Pronghorn Recovery Team.

Ranking		Sonoran Pronghorn Recovery Actions
Priority	Average	
1	1.00	Maintain active radiocollars on ~10% of the Sonoran pronghorn population for population monitoring and other study purposes
2	1.18	Experimentally place small, portable, temporary waters in occupied habitat during the summer months, and evaluate their use and efficacy
3	1.18	Develop a white paper that addresses the full range of captive breeding alternatives (e.g., capture alternatives; age and sex of wild caught animals; husbandry requirements, herd monitoring, holding facilities, transportation, release criteria, need for predator control, post-release monitoring and etc.)
4	1.18	Continue biennial , or possibly annual, population survey of the U.S. sub-population
5	1.18	Continue weekly aerial monitoring of radiocollared pronghorn (i.e., distribution, movements, mortality signals, fawn status, predator presence)
6	1.27	Develop an intensive monitoring program to quantitatively investigate pronghorn use of water tanks (i.e., permanent, semi-permanent, temporary, emergency)
7	1.27	Continue monitoring fawn recruitment while conducting weekly telemetry flights
8	1.27	Implement and monitor experimental forage enhancement project on BMGR
9	1.36	Identify, evaluate, and prioritize potential reintroduction sites in the U.S. and Mexico
10	1.36	Initiate biennial population surveys for the 2 Mexico sub-populations to be timed in conjunction with the U.S. survey
11	1.45	Continue monitoring (and closing as needed) of military targets, relative to pronghorn locations, by contract biologists on NTAC and STAC on BMGR on live fire days
12	1.45	Continue ongoing program of hauling water as needed to permanent tanks in currently occupied pronghorn habitat (e.g., Jose Juan Charco, Halliwill Catchment, etc.) until proposed pronghorn/water investigations are conducted and program can be quantitatively reevaluated
13	1.73	Develop a study looking at seasonal diets (e.g., fecal analysis)
14	1.73	Continue restrictions on types of use in important pronghorn habitat during critical periods of the year (e.g., OPCNM periodic seasonal closure of Pozo Nuevo Road; CPNWR closure to public use of Chico Shunie Loop Road, Marine use of certain ground sites on BMGR)
15	1.73	Contract with a population geneticist or American Zoological Association to conduct an analysis of what comprises a minimum population in order to maintain the gene pool and to assess at what point if the U.S. sub-population continues to decline, all remaining pronghorn should be taken into captivity
16	1.82	Initiate study by AGFD to evaluate effects of Border Patrol helicopter flights on pronghorn
17	1.91	Develop study to investigate potential contaminant concerns from military activities on BMGR (e.g., soil/vegetation sampling; blood and tissue samples from captured pronghorn; sampling of other resident wildlife) for baseline data
18	1.91	Continue aggressively investigating and documenting all incidences of mortality

		(collared and uncollared) and likely causes
19	1.91	Deploy remote data loggers as needed to document use of water sources, travel corridors, and/or foraging areas by radiocollared pronghorn
20	1.91	Initiate AGFD/USAF study to evaluate effects of night missions on pronghorn behavior/activity
21	1.91	Experimentally mark a sample of coyotes with GPS collars to determine behavior and seasonal movements relative to pronghorn locations, free water, rainfall events
22	2.00	Develop a study to monitor/investigate influences of disease and other stressors on pronghorn
23	2.00	Assess effectiveness of current aerial population survey methodology and compare with current literature
24	2.00	Continue law enforcement activities designed to reduce illegal border traffic (e.g., foot and vehicle UDA's, drug smuggling) and as a consequence movement through pronghorn habitat
25	2.09	Investigate <i>Culicoides</i> sp. as a vector source in the transmission of bluetongue and EHD to pronghorn from cattle and other native ungulates
26	2.09	Continue field work by U of A and preparation of vegetation association map for OPCNM, BLM, CPNWR, BMGR
27	2.09	Develop a water balance study (e.g., double-labeling, water deprivation, use of pre-formed/metabolic water in diet) using a surrogate race of captive pronghorn
28	2.09	Expand genetic determinations to include Mexico as opportunity allows (e.g., Peninsular pronghorn and Sonoran sub-populations)
29	2.18	Investigate impacts of helicopters from other program activities (e.g., Marine Corps WTI, other military activities, U.S. Customs Service, other State and Federal management agencies) on pronghorn
30	2.18	Initiate periodic aerial surveys in Mexico at other times of the year than the population census to monitor herd size, composition, distribution, natality, etc.
31	2.18	Investigate effects of public use and other ground-based activity (e.g., military training, ordnance clean-up, law enforcement, land management agency activities such as grazing, firewood cutting, and mining) on pronghorn
32	2.18	Complete AGFD contract with Purdue University to look at taxonomic status using established genetic markers of Sonoran pronghorn relative to other races of pronghorn
33	2.27	Continue to promptly notify CPNWR of all pronghorn mortalities; recovery team leader keeps a file on all reports and maintains a summary table of all mortalities and known facts
34	2.27	Incorporate a habitat assessment component in currently used population survey technique to monitor annual change/variation in range condition
35	2.27	Complete range assessment of 4 allotments by the BLM and application of Standards and Guidelines to ensure adequate forage for pronghorn and habitat improvement
36	2.27	Evaluate pronghorn location data relative to available habitat using normalized digital vegetation index and/or other forms of satellite data
37	2.36	Develop a narrowly-defined and rigidly controlled coyote removal plan
38	2.36	Develop study to continue to evaluate water quality at bomb craters that fill with water and are frequented, at least seasonally, by pronghorn
39	2.36	Update the PVA in light of new, more quantified data on various aspects of pronghorn biology and PVA techniques



40	2.36	Evaluate occurrence of bluetongue and EHD in cattle and native ungulate species and their potential to serve as a reservoir for these diseases
41	2.45	Fix highway (e.g., Highway 85, Interstate 8), International Boundary, and other fences to make them pronghorn accessible or pronghorn barriers as determined necessary
42	2.45	Prepare a written protocol for dealing with injured or dead pronghorn including permit authority, agency and veterinarian contact numbers, notification protocol, transportation, housing and/or disposal procedures
43	2.55	Compile extant reports of pronghorn watering (documented and anecdotal), review of literature, and prepare a technical reviewed article
44	2.55	Continue timely coordination with Recovery Team and Phoenix Ecological Services Office on all proposed use changes on Tactical Ranges
45	2.55	Investigate blank spots in current pronghorn range distribution maps (e.g., targeted aerial surveys, remote sensing)
46	2.55	Experimentally provide mineral supplement blocks
47	2.55	Conduct a comprehensive literature review of pronghorn/barrier interactions and wildlife passage devices and designs (to include literature for other ungulate species when appropriate)
48	2.63	Develop a back-up plan in the event of a hoof and mouth outbreak
49	2.7	Construct and staff a Sonoran Desert greenhouse for producing key forage plants for transplanting
50	2.7	Assess all wildlife and livestock waters on 4 BLM allotments as to pronghorn accessibility and/or potential traps
51	2.9	Develop a medical kit with all necessary materials for treatment, salvage, and/or necropsy with description of procedures and handling of biological samples

Each recovery team member assigned a rank of high = 1, medium = 2, or low = 3 to each project. Since there are 51 projects and 3 rankings, exactly 1/3 of the projects were ranked high, medium, or low by individual team members. The assigned rankings were averaged and the lower the score, the higher the priority. In the event of a tie between 2 or more projects, the project with the lowest variance was ranked higher. The theoretical highest and lowest possible rank that can be achieved by a given recovery action is 1.0 and 3.0, respectively.